

ABSTRACT

Title of Document: GENERAL AND SPECIFIC DISPLACEMENT EFFECTS OF POLICE CRACKDOWNS: CRIMINAL EVENTS AND “LOCAL” CRIMINALS

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Geographically focused police crackdowns have widely diffused amongst larger American police departments in the past decade and have been recently cited in a Police Executive Research Forum survey as the most commonly used tactic to combat violent crime. Evidence from a number of randomized control trials, systematic reviews, and meta-analyses suggests that these interventions have the ability to reduce crime without displacing it to nearby locations. However, virtually every study of crime displacement in response to a geographically concentrated police intervention focuses on small buffer zones immediately surrounding the intervention location. While crime may not displace just around the corner, to date, few studies have tested displacement beyond this limited geographic constraint.

During the summer of 2011 the Metropolitan Police Department of Washington D.C. implemented a geographically focused arrest-driven police crackdown called the Summer Crime Initiative (SCI). The current work aims to examine the impact of the SCI on the volume and placement of robbery through a quasi-experimental research design. By developing a theoretically informed framework, a broader set of hypotheses regarding

local and non-local crime displacement are tested. The results of this study confirm prior research on crime displacement. Despite reductions in robbery, there is no evidence that these offenses or offenders were displaced within or beyond two blocks of the intervention sites.

GENERAL AND SPECIFIC DISPLACEMENT EFFECTS OF POLICE
CRACKDOWNS: CRIMINAL EVENTS AND “LOCAL” CRIMINALS

By

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Chapter 1: Introduction

The Promise of Geographically Based Policing Interventions

In the current fiscal climate of austerity and deficit reduction, local, state, and federal criminal justice agencies in the United States are looking to squeeze every dollar they can out of their budgets. Police departments have not been immune to this downsizing, and many notable examples exist of large urban police departments being forced to release a non-trivial number of officers. For example, in January 2011, Camden New Jersey laid off 163 police officers, nearly half its force, leaving the city guarded by the fewest number of officers since 1949 (Goldstein, 2011). In November 2010, Newark laid off 167 police officers, the largest single reduction in 32 years (Friedman, 2010). And in Trenton New Jersey, 105 were laid off in 2011 (Zdan, 2011). The story is similar in other states as well. In 2010 Oakland California laid off 80 officers and 21 cadets (Kuruvila, 2012), Tulsa Oklahoma 124 (Barber, 2010), and Jacksonville Florida 48 (Schoettler and Patterson, 2011). Yet, the public's demand for safe communities has not declined. In light of this demand for equal service, despite reduced resources, the police more than ever need to get "smart" on crime by taking an evidence-based approach.

Perhaps no model of policing offers more promise and evidence to effectively and efficiently use resources than hot spots patrols¹, an approach which focuses police patrol in the places crime is most likely to occur. Indeed, based on the findings from a number of experimental and quasi-experimental evaluations, the National Research Council Committee to Review Research on Police Policy and Practices (2004, p.50) concluded, "...studies that focused police resources on crime hot spots provided the strongest

¹ Hot spots policing is a general classification of directed police activities that may include 1. problem-oriented policing 2. increased patrol 3. drug enforcement operations 4. increased gun searches and seizures or 5. zero-tolerance policing (see Braga et al., 2012, p.43)

collective evidence of police effectiveness that is now available.” While it has long been a concern that interventions, such as hot spots policing, which concentrate police resources in one area will simply spread crime to another (Chaiken et al., 1974; Lateef, 1974; Mayhew et al., 1976; Press, 1971; Reppetto, 1976), recent empirical explorations challenge this notion. The new, evidence-based assumption, is that displacement from focused crime prevention interventions is, “seldom total and often inconsequential (Weisburd et al., 2006, p.551).” Therefore, hot spots policing would seem like a logical solution to the challenge of the current fiscal restraints imposed on federal, state, and local police departments.

However, there is reason to claim that the displacement hypothesis has not been robustly explored, with empirical tests relying on methodologies that only examine *immediately adjacent* crime displacement to small typically two block buffer zones. Related to this argument, these tests of crime displacement have been limited by a lack of integration from recent advances in our knowledge of offender decision-making, target selection, and criminological theory. Such information could inform a framework for measuring crime displacement that provides for a broader set of possibilities. Given the widespread adoption of hot spots policing and its prominent usage among departments to deter violent crime (PERF, 2008), it is critical to explore the possible displacement effects thoroughly.

This dissertation proposes to more rigorously test the displacement hypothesis by examining it both locally and non-locally. Specifically, the current work seeks to examine the impact of the 2011 Metropolitan Police Department Summer Crime Initiative’s (SCI) on robbery. After examining the impact of the SCI on robbery in the areas targeted by

police, testable hypotheses are developed and examined based on what is known about offender target selection and decision making. This approach thus links those offenses actually prevented to a theoretically and empirically informed framework used to test displacement. Finally, by following a cohort of active robbers the current work is able to extend previous analysis by examining the relocation of crime anywhere in a jurisdiction in addition to local changes in adjacent buffer zones.

Hot Spots Policing

Hot spots policing is an approach informed by relatively recent empirical and theoretical advances. In 1989, Sherman and colleagues first documented the high degree of spatial crime clustering in Minneapolis Minnesota (see also Sherman, 1987). Just five percent of street addresses were responsible for over half of all calls for service. And while theories of crime for much of the 20th century were focused on individual level factors, Ron Clarke (1980), Cohen and Felson (1979), and other scholars proposed to shift the emphasis to crime generators at the micro level. The coalescence of these two streams of research made it highly sensible for police to focus a disproportionately large amount of resources within small crime clusters.

In the wake of this evidence, and less sanguine findings about the efficacy of random preventative patrol (Kelling et al., 1974), rapid response to calls for service (Spelman and Brown, 1984), and investigations (Greenwood et al., 1975), hot spots policing diffused rapidly among larger American police departments. According to the 2007 Law Enforcement Management and Administrative Statistics Survey, over half of all police departments serving a population of \$50,000 or more utilized computers to identify hot spots of crime. These percentages increase when examining larger

populations served. For example, among departments serving cities with a population between 100,000 and 249,999, 66% identify hot spots, between 250,000 and 499,999, 80%, and between 500,000 – 999,999, 100% use computers to identify crime hot spots.

Table 1: Analytic Functions of Computers in Local Police Departments

Population Served	2003	2007	% Change
All Sizes	11%	13%	+18.18%
1,000,000 +	56%	92%	+64.29%
500,000 – 999,999	54%	100%	+85.19%
250,000 – 499,999	63%	80%	+26.98%
100,000 – 249,999	54%	66%	+22.22%
50,000 – 99,999	40%	56%	+40.00%
25,000 – 49,999	29%	31%	+6.90%
10,000 – 24,999	17%	19%	+11.76%
2,500 – 9,999	8%	9%	+12.50%
Under 2,500	3%	5%	+66.67%

Source: Law Enforcement Management and Administrative Statistics

Further evidence from Weisburd and Lum (2005) and a recent Police Executive Research Forum survey document how departments are not only mapping crime hot spots, but are using this information to direct patrol. Weisburd and Lum surveyed a random sample of 125 police departments with 100 or more sworn officers² asking a variety of questions about the adoption of computerized crime mapping. Findings from their pilot survey were able to draw a direct link between the diffusion of computerized crime mapping and hot spots policing. Of those departments utilizing computerized crime mapping, the most common response was “to facilitate hot spots policing.”

Similar results were reported in a survey of 176 police agencies by the Police Executive Research Forum (2008, p.3). In response to an earlier survey documenting increases in homicide and other violent crime, PERF asked these 176 agencies about the types of programs they were implementing to reduce these increases. Hot spots policing

² The authors drew their sample from the complete list of law enforcement agencies with 100 or more sworn officers tabulated in the 1999 LEMAS Survey.

was by far the most common response, being listed by 63% of agencies. Additional responses were much lower: 37% cooperation with other departments, 20% hiring or recruiting more officers, 17% federal grants such as weed and seed, and 15% cited technologies such as cameras. Thus, hot spots policing has diffused rapidly, particularly among larger agencies, and is the main tactic used by departments to combat violent crime, such as robbery.

Crime Displacement and Methodological Limitations

Criminologists have been concerned about these types of geographically focused policing interventions causing crime displacement—a geographic shift in crime from the target site to non-treated areas—since at least the 1970’s (Reppetto, 1976). Indeed, in the very first randomized hot spots experiment it was commonly articulated by the participating Minneapolis Police Officers that crime would, “just move around corner” (Sherman and Weisburd, 1995). Because of this concern, displacement is frequently measured in studies of hot spots policing, with few studies actually documenting statistically significant displacement (see Bowers et al., 2011).

These examinations almost always rely on a buffer zone approach—generally small catchment areas, 2-3 blocks beyond the target perimeter, drawn immediately adjacent to the target location. These buffers are meant to “catch” any crime spillover caused by the intervention. In one of the earliest examinations of crime displacement, the researchers in the Jersey City Drug Market Experiment drew two block buffer zones around the treatment locations, finding no evidence of displacement (Weisburd and Green, 1995). Weisburd and colleagues again in Jersey City (2006), Braga and Bond in Lowell Massachusetts (2008), Ratcliffe et al. in Philadelphia, (2011) and Taylor et al in

Jacksonville, Florida (2011) all utilized similarly sized buffer zones and all came to similar conclusions about displacement.

However, this approach is only appropriate for measuring displacement to areas immediately adjacent to the target locations. Therefore, it can more appropriately be stated that there is limited evidence that crime is displaced to areas immediately adjacent to hot spots during crackdowns. Recent advances in our knowledge about offender movement (Tita and Griffiths, 2005; Van Koppen and Jansen, 1998; Wiles and Costello, 2000), non-adjacent spatial ties between places (Mears and Bhati, 2006; Tita and Radil, 2011), and the specific motivations and target selection procedures of robbers (Conklin, 1972; Feeney, 1986; Gill, 2000; Jacobs and Wright, 1999; Matthews, 2002; Morrison and O'Donnell, 1994; Wright and Decker, 1997) challenge the notion of using this type of methodology suggesting that displacement may not be best measured using small catchment areas.

For example, Tita and Radil examine both traditional conceptualizations of spatial relationships, those which examine the influence of immediate neighbors, but also consider more distant influences in their study of the distribution of gang violence (2011). They argue that gang rivalries may be related to their proximity of one another, but found the social networks they are embedded in, many of which are non-adjacent ties, were also influential. These networks linked individuals within one community, but also those separated by larger distances. Similarly Mears and Bhati (2006) argue that beyond spatial similarity, social similarity is also important in determining the influence between locations, with places that are more homogeneous having greater influence. By examining the influence of resource deprivation among both spatially similar and socially

similar communities, the authors demonstrate how both contexts matter. While resource deprivation in one location influenced homicides in neighboring locations, it also had statistically significant impacts in social similar, but not adjacent locations.

Specifically, the motivations and target selection procedures of robbers indicate that they may not be fully deterred by a police crackdown. There is evidence to suggest that some robbers are strongly motivated to continue their offender through a “pressing need” for cash that is likely to exist before, during, and after any law enforcement crackdown in a crime hot spot (Wright and Decker, 1997). Additionally, when opportunities are blocked in one location, robbers exhibit characteristics that make non-adjacent offense relocation probable. Evidence suggest that many robbers’ journey-to-crime extends well beyond the small two block buffer zones used to capture displacement (Capone and Nichols, 1976; Van Koppen and Jansen, 1998; Wiles and Costello, 2000), robbers may be able to familiarize themselves with opportunities in previously unknown locations with little effort (Deakin et al., 2007), and when examining the target selection procedures of robbers, discernible patterns emerge which afford the potential to predict, measure, and perhaps prevent such non-adjacent relocation.

The buffer zone approach and other techniques which rely on selecting adjacent areas to measure displacement are only adequate if the sole concern of police crackdowns is their ability to displace crime literally around the corner, typically just a few blocks from the treatment location. This view is an oversimplification of the problem. Scholars have taken the “move around the corner” problem quite literally and have neglected to examine non-adjacent displacement. As Guerette and Bowers have stated, “the proximity hypothesis of displacement is the outgrowth of theories on crime that remain just that,

theories that are largely untested (2009, p.1356).” The current work takes a more nuanced look at crime displacement, by arguing certain types of offenses and offenders, such as robbers, are more displaceable. By focusing on the unique characteristics of these offenders, the places they target, and the impact produced by the intervention under study, the current work is able to develop a broader range of displacement possibilities. While short of developing a theory of crime displacement, the current work links the theories and empirical findings of Situational Action Theory (Wikström et al., 2012) and Routine Activities Theory (Cohen and Felson, 1979) to develop a theoretically and empirically informed set of testable hypotheses regarding the displacement of crime.

These are important contributions to the displacement literature, as they aim to advance our understanding of not just how adjacent communities influence one another (the traditional approach in crime displacement research), but how those which are more distant geographically are linked socially. For spatial displacement scholars these findings are important as they demonstrate that crime interventions located in a given area may have benefits (or consequences) in locations that are not just immediately adjacent. Thus, crime displacement may not be best thought of in terms of immediate spatial displacement, but a more nuanced and contextualized process.

Research Question

This dissertation examines how the structure of a communicated criminal sanction threat by police affect offender decisions about whether, when, and where to commit robbery. Specifically, what do robbers do when police increase arrests in mezzo-areas of elevated crime, and robberies in those areas decline? The argument this dissertation makes is that studies of crime displacement in response to police action to date, have

failed to fully capture the phenomenon since they rely on small buffer zones unable to document behavior that is non-adjacent. Furthermore, by frequently taking a one size fits all approach to displacement, researchers wind up treating all crimes as being equally displaceable. This dissertation provides a more robust test of the crime displacement hypothesis by examining the phenomenon at both the specific (within individual) and general (within small buffer zones) level. Moreover, it focuses on the displacement of robbery as this dissertation argues many robbers are strongly motivated (Conklin, 1972; Feeney, 1986; Gill, 2000; Jacobs and Wright, 1999; Matthews, 2002; Morrison and O'Donnell, 1994; Wright and Decker, 1997) and that this motivation is not likely to cease in the face of police action. Additionally, robbery is a crime that is displaceable based on the nature of the sanction threat communicated by police during the 2011 SCI, the intervention this research examines. The visibility of street patrol is more likely to drive robbers from these areas, than thieves who operate indoors.

By examining displacement both locally and non-locally at the individual level, using data from the Metropolitan Police Department of Washington DC's 2011 SCI, this dissertation will answer the question of whether a crackdown targeted in one set of places moved offenders from those place to other places within the city, both adjacent to and distant from the targeted hot spots. The question will be posed about a crackdown that occurred between May 1st and July 31st of 2011, when the department focused 24 hour police patrols in five crime hot spots. Officers in these locations largely relied on intensive patrolling tactics and increases in arrests. According to the Metropolitan Police Department's 2012 Annual Report, the 2011 Summer Crime Initiative reduced robbery. The current dissertation examines this claim more robustly by relying on a quasi-

experimental framework. After confirming this reduction in robbery, a focus is applied to whether this reduction in robbery led to crime displacement.

Examining whether crime is displaced non-adjacently is important for a number of reasons. Hot spots policing is widely practiced among American police departments and, according to a recent PERF survey, is the most widely used tactic to combat violent crime (2008). At a time when police resources are stretched due to the current fiscal crisis, police cannot afford to be using resources inefficiently. Indeed, these departments may in fact be spreading crime around to other areas in greater numbers than are even reduced in the target locations, and even worse, may transfer crime to more vulnerable populations such as the elderly and communities with inadequate resources to respond. By documenting non-spatial displacement, police may be able to anticipate the locations crime is mostly likely to be displaced. And when displacement is more accurately measured, it can help refine our knowledge about the efficacy of hot spots policing and the policing styles employed in these locations.

Chapter 2: Literature Review

Crisis in Policing Confidence

If there was any doubts about the police's role in society, that doubt was clearly and bluntly dispelled in the Johnson Crime Commission Report, *The Challenge of Crime in a Free Society* (1967, p.92-93).

“The police did not create and cannot resolve the social conditions that stimulate crime. They did not start and cannot stop the convulsive social changes that are taking place in America. They do not enact the laws that they are required to enforce, nor do they dispose of the criminals they arrest... the fact remains that the mission of the police is not to remove the causes of crime, but to deter crime, and to deal with specific criminals whoever they are, and with the specific crimes whenever, wherever and however they occur.”

However, in the 1970s, there was growing skepticism within the United States questioning the ability of the police to even prevent crime. Findings from a number of empirical studies indicated that core strategies in what has been called the “standard model of policing” (see Weisburd and Eck, 2004) were unsuccessful in reducing crime. Among these bedrock assumptions challenged were random preventative patrol (Kelling et al., 1974), rapid response to calls for service (Spelman and Brown, 1984), and police investigations (Greenwood et al., 1975). Indeed even noted police scholar David Bayley concluded,

“The police do not prevent crime. This is one of the best kept secrets of modern life. Experts know it, the police know it, but the public does not know it. Yet the police pretend that they are society's best defense against crime and continually

argue that if they are given more resources, especially personnel, they will be able to protect communities against crime. This is a myth” (1994, p.3).

This sentiment of “nothing works” was not restricted to policing, but was a general malaise felt throughout the criminal justice system, notably memorialized in an influential report by New York Sociologist Robert Martinson (1974), who exclaimed, “with few and isolated exceptions, the rehabilitative efforts that have been reported so far have had no appreciable effect on recidivism” (p.25).

If the police cannot address the root causes of crime, and if their tactics used to deter crime are ineffective, what should they do? In order to adapt to the challenges presented by these less sanguine findings, and the zeitgeist of nothing works, it has been argued that the field of policing moved into a period of almost unprecedented innovation, which was not merely technological, but fundamentally changed how the police operated (Weisburd and Braga, 2006).

The Promise of Hot Spots Policing

Among the many policing innovations developed in the wake of the Martinson era, hot spots policing is perhaps the most lauded, receiving both theoretical and empirical support. Indeed, it has been cited as one of the few policing innovations to have been widely adopted on the basis of research evidence, as opposed to ideology and other non-empirical mechanisms (Weisburd and Braga, 2006). This may seem logical, but many innovations are widely adopted despite a lack of evidence of their efficacy (Rogers, 2003). To this day it is still a commonly held belief among law enforcement agencies that rapid response can increase arrests (Telep and Lum., in press) despite empirical evidence to the contrary (Spelman and Brown., 1984).

While there is no standard definition of hot spots (Chainey and Ratcliffe, 2005) or hot spots policing, the concept generally refers to focusing police resources on an area smaller than a neighborhood or police beat, which contains a disproportionate amount of crime. For example, Sherman and colleagues refer to these places that are, “a fixed physical environment that can be seen completely and simultaneously, at least on its surface, by one’s naked eyes (1989, p.31).” However, in a more recent articulation by Jerry Ratcliffe and colleagues at Temple University and the Philadelphia Police Department, they identified hot spots containing multiple intersections that were not all visible from one single epicenter. Their study of foot patrol in crime hot spots identified 120 locations, which contained an average of 14.7 street intersections and 1.3 miles of streets (Ratcliffe et al., 2011). Similarly, in Indianapolis (McGarrell et al., 2001), police focused on four beats in two areas of the city comprising approximately 4.6 square miles.

Documenting the amount of police resources expended in these areas is another heterogeneous measure in the research. While the length of the initiative may offer the most convenient measure, this is a very crude proxy for the dosage of a hot spots policing initiative. A more appropriate comparison would be an examination of the actual increase in the police force on the street or changes in productivity. This comparison is complicated by the ability of researchers to directly measure police dosage. Sherman and Weisburd (1995) were some of the first researchers to tackle this problem. In the Minneapolis Hot Spots Experiment Sherman and Weisburd (1995) worked with a large grant from the National Institute of Justice, and were thus able to conduct 7,542 hours of systematic observations to document police activity. From these data they were able to determine that most experimental hot spots received 1.3 to 1.7 minutes of patrol per 10

minutes of observations compared to .7 to .8 minutes in ten among control locations. This increased dosage was highly variable however, ranging from as high at 6:1 down to 1:1.

In Philadelphia researchers were also able to conduct field observations, but not in a sufficient amount to produce any “robust measure of dosage” (Ratcliffe et al., 2011, p.820). The authors noted that each of the 60 experimental locations was supposed to be patrolled by two pairs of officers in a morning (10am – 6pm) or evening (6pm – 2am) shift Tuesday through Saturday nights for three months. Theoretically, this has the potential of 57,600 hours of patrol, however, there was some evidence that the experiment may have been subverted as field observers “reported that only a few foot patrol boundaries were rigidly observed... several officers—either through boredom or a perception that they were displacing crime to nearby streets would stray for a time if they were aware of areas of interest just beyond the foot patrol area” (p.806).

Similarly in Jacksonville (Taylor et al., 2011), researchers noted that the 21 saturation locations were supposed to receive an average of 53 officer hours per week over three months. This is far lower than the 160 officer hours per week in Philadelphia (16 hours per day * 2 officers * 5 days a week = 160 officer hours per week per hot spot). However, Jacksonville lacked any independent observation of police presence.

Given these challenges, a few studies attempt to indirectly measure police presence through changes in their productivity such as arrests, traffic citations, and vehicle stops. For example, McGarrell et al, 2001 examined the number of arrests, traffic citations, warning tickets, vehicle stops, and gun seizures in Indianapolis³. Additionally,

³ “Unfortunately, [the authors did] not have access to time-series data on police activity levels. Thus, [they] cannot systematically examine the level of increase in police activity. IPD officials note that the level of police activity during the directed patrol initiative was “dramatically” higher than was normal police activity in these target area (p. 131).”

they created standardized metrics of these data controlling for area, number of residents, and project duration in order to compare the dosage in Indianapolis to another gun crackdown in Kansas City (see Sherman and Rogan, 1995).

Other studies, while focusing police efforts in hot spots, are perhaps less appropriate to compare to the current works dosage. Several of these studies (see Weisburd and Green, 1995; Braga and Bond, 2008) focus on Problem Oriented Policing efforts, not just mere officer saturation. Thus, a dosage comparison may not be appropriate, because the dose used in POP changes *how* officers police, not *how many* police. For example, The Jersey City Drug Market Analysis Experiment sought to develop *new* strategies for addressing street-level drug problems beyond standard patrol saturation.

While the heterogeneity in units of analysis and dosage may be problematic when assessing the utility of these approaches, they all offer a relatively new tactic in policing around directed enforcement—a stark contrast to the more traditional random omnipresence of resource allocation that dominated policing from the 1920s to 1980s (see Kelling and Wycoff, 2001). The following section examines both the theoretical and empirical support which helped to facilitate the development and diffusion of this approach.

Theoretical

For much of the 20th century, theoretical criminologists were focused on identifying factors related to criminal offending irrespective of geography (Weisburd and Braga, 2006), such as self-control (Gottfredson and Hirschi, 1990), social bonds (Hirschi, 1969), strain (Agnew, 1985; Merton, 1938), institutional anomie (Messner and

Rosenfeld, 1994), and deterrence (Becker, 1968). Beginning in the late 1970s a renewed interest⁴ among academics began to incorporate the importance of place within theoretical thinking, leading to the emergence of what is sometimes referred to as environmental criminology.

Every crime has three elements: suspects, victims, and places of occurrence. Environmental criminology focuses on this last element and attempts to change the nature of the places that generate crime. Among the earliest academics to refocus on place were Cohen and Felson (1979), who noted that there was an over-emphasis on individual criminal motivation to the neglect of other elements in the “crime equation.” They argued that beyond motivated offenders, a suitable target and lack of capable guardian also needed to be present in time *and* space for crime to occur. In other words, the opportunities for crime were not ubiquitously distributed in space. Similarly, Ron Clarke and other British scholars began to focus on the role opportunity played in fostering and inhibiting crime. They believed that if the situations which increased the probability of crime could be altered, as opposed to rehabilitating individual offenders, it could have a significant impact on crime (Clarke, 1980). This approach became known as situational crime prevention.

Situational Crime Prevention encompasses a host of techniques which fall under the domain of secondary prevention—they are geared toward changing the features of place which are either already crime hot spots or at risk of becoming ones. Whereas

⁴ Scholars had previously examined the importance of crime and place in the 20th century. For example, Shaw and McKay analyzed the characteristics of neighborhoods which led otherwise normal individuals to get tied up with the criminal justice system (1942). However, there is a fundamental distinction between these earlier uses of crime and place, from the later advancements in the 20th century. More recent theoretical work focused on micro places such as a handful of intersections, whereas Shaw and McKay examined whole neighborhoods, a much more macro level.

primary prevention programs aim to make large scale sweeping changes to an entire neighborhood, situational crime prevention tactics generally focus on a specific area attempting to change its environment in a way which makes offending less attractive. Thus, situational crime prevention rests on the notion that offenders are rational decision makers who respond to opportunities and changes in risks (Lab, 2010).

A number of techniques have been developed over the years aimed at reducing place based situational inducements to crime. Cornish and Clarke (2003) have published a comprehensive list of these techniques under five broad categories: 1. Increase the effort 2. Increase the risk 3. Reduce the rewards 4. Reduce the provocations and 5. Remove excuses. A number of studies have examined the impacts of these measures with varying findings.⁵ Despite criticisms that Situational Crime Prevention cannot explain the causes of crime, does not address these root causes, and merely displaces crime, it has gained wide support among criminal justice agencies.

Oscar Newman, an architect by trade, developed an approach called Crime prevention through environmental design (1972, 1996). This theory is based on the concept of defensible space which Newman sees as the physical extension of the communities desire to minimize the probability of crime. This physical extension limits the amount of crime opportunities through four elements identified by Newman (1972): territoriality, natural surveillance, image, and milieu.

One way to create defensible space and incorporate these elements is to create “mini-neighborhoods”. This can be achieved in a number of ways, and generally involves reducing the amount of shared space and access to the area by non-residents. Newman argues that this will increase neighborhood cohesion among residents which fosters social

⁵ See Eck (2002) for a review of the literature.

ties, collective efficacy, and informal social control. Mini-neighborhoods minimize the number of strangers within a given area and create a more intimate environment. This reduce anonymity makes it more difficult for strangers to enter a space and get away with committing a crime. Finally, it also increases a sense of ownership of a location. When individuals have more control over an area, particularly if it is their own personal space, they are more likely to maintain and guard the location. Through a series of case studies there appears to be anecdotal evidence that the theory has some positive effect on crime (Newman, 1996).⁶

While these theories differ on the approaches taken, they each acknowledge that place is an important determinant of crime, and that by focusing resources in these locations, significant crime reductions can be achieved. However useful these types of micro approaches were in developing hot spots policing, their explanatory power is generally weak when juxtaposed with other units of analysis. In an examination of criminological research's explanatory power of articles published in *Criminology* between 1968 and 2005, Weisburd and Piquero (2008) document that as much as 80-90% of the variability remains unexplained, with no improvement over time. And the results from specific research at the micro place (address or street segment)⁷ are among the poorest, with, "higher units of aggregation generally yield[ing] a higher average" (p.12). This is not an exhaustive evaluation of each of the aforementioned theories, but it may more generally suggest that our knowledge of why crime clusters at the micro place is

⁶ An evaluation produced in "The Maryland Report" discusses many similar interventions in greater detail separating out the effects of each strategy (Eck, 2002).

⁷ It should be noted that only one study at the micro place was included in their analysis and that many evaluations of Routine Activities Theory and Rational Choice Theory were done at a macro or individual level. Indeed, these theories contained among the highest explanatory power when detached from the unit of analysis.

limited at this point in time, needing further theoretical refinement in order to provide more nuanced recommendations to policy makers and practitioners beyond what has been offered

Impact Evaluations

There is a growing body of evidence indicating that hot spots policing deters crime. Indeed, in a 2004 review, the National Research Council concluded that “...studies that focused police resources on crime hot spots provided the strongest collective evidence of police effectiveness that is now available” (p.250). Similar conclusions have been drawn from Anthony Braga’s Campbell Collaboration Systematic Review (2007), documenting that seven of the nine studies examined had statistically significant crime reduction effects. When focusing on studies using an experimental design, moderate mean effect sizes were noted, leading Braga to conclude, “extant evaluation research seems to provide fairly robust evidence that hot spots policing is an effective crime prevention strategy” (p.18). In a 2012 update to this Campbell Review, Braga and colleagues again documented “noteworthy crime and disorder reductions” (p.6) in 20 of 25 tests of hot spots intervention.

The first randomized experiment studying hot spots policing occurred in Minneapolis Minnesota in the late 1980’s. Utilizing a relatively new technology, computerized crime mapping, Sherman and Weisburd (1995) randomly selected 55 out of 110 of the cities hot spots to receive, on average, twice⁸ as much observed patrol. These hot spots were usually centered around a particular intersection and expanded out in all directions, but only as far as the eye could see. While officers were directed to stay in

⁸ It should be noted that the dosage was variable over the course of the experiment ranging from nearly a 1:1 to 6:1 in the experimental to control area.

these locations more often than their controls, they were given complete discretion as to what they actually did while there⁹. Over 7,542 systematic observations verified their increased presence as well as the nature of their activities ranging from proactive problem solving to passively sitting in their patrol car.

When comparing the impact on calls for service between the experimental and control areas over the course of a year, total crime was reduced in absolute terms between 6.3 and 13.1 percent, soft crime calls (e.g., break-in alarms, disturbances, drunks, noise, unwanted persons at businesses, vandalism, prowlers, fights, and person down) declined between 7.2 and 15.9 percent, and hard crime calls (holdup alarms, burglary, shooting, stabbing, auto theft, assault, and rape) were lower in the hot spots receiving extra patrol compared to those not receiving extra patrol, by a difference of between 2.6 and 5.9 percent depending on the reporting period examined¹⁰ (Sherman and Weisburd, 1995).

Prior to hot spots policing, the conventional wisdom on police patrol's efficacy was based on findings from the Kansas City Preventative Patrol Experiment (Kelling et al., 1974), which documented the police's inability to reduce crime or victimization when doubling or removing a random patrol presence. However, that study has since been criticized for its poor methodology and implementation, including its low dosage and statistical power (see Larson, 1975; Sherman and Weisburd, 1995). This last point is particularly important, because while Kelling et al (1974) documented a 300 percent increase in robberies reported in areas less heavily patrolled, the result was not statistically significant because of the low base rates of the offense (Sherman and

⁹ One research gap is the lack of knowledge on what types of tactics work best while in these hot spots. While beyond the scope of the current dissertation, evidence is beginning to suggest that a problem-oriented approach is most effective.

¹⁰ It should be noted there was a fair amount of variation in the effect sizes and directions. Some sites showed modest reductions, some large, and some showed increases (Weisburd and Green, 1995).

Weisburd, 1995, p.627). Regardless, in light of the discovery of crimes concentration among a small number of places, random preventative patrol makes little sense.

Kansas City conducted the first randomized experiment of police raids, randomly assigning officers to raid 104 of the city's 207 eligible crack houses. While crime was reduced, effects were small. Researchers noted a net reduction of 8 percent in calls for police service, which translates into 85 averted calls. This amounts to less than one call prevented per raid conducted. Importantly, the work demonstrated the potential for these types of efforts to have fleeting effects. Results from the study showed that while the initial reductions were large, and continued to increase for two days, the effect declined thereafter and finally disappeared after 12 days (Sherman and Rogan, 1995).

The Jersey City Drug Market Analysis Experiment sought to develop new strategies for addressing street-level drug problems. After identifying 56 drug hot spots, officers were randomly assigned in statistical blocks to half of these locations to implement the treatment. This treatment followed a step-wise problem oriented fashion. In the "planning stage" the team collected information on the physical, social, and criminal characteristics of these places. In the "implementation stage" officers utilized community and business engagement as well as police crackdowns to reduce drug related offenses in these areas. Finally, in the "maintenance stage" officers sought out ways to maintain the gains which had previously been made (Weisburd and Green, 1995). Results indicate that experimental hot spots had consistent and strong reductions in disorder-related calls for service when compared to control locations.

Similar results were found in Lowell, Massachusetts, where a problem-oriented approach was also taken, but this time in the context of physical and social disorder hot

spots (Braga and Bond, 2008). Despite officers engaging in what was classified as “shallow” problem solving, relying more closely on a general policing strategy, the evaluators noted a statistically significant 20% reduction in crime and disorder calls for service when comparing treatment to control hot spots. More specifically, the strategy worked best when utilizing situational crime prevention tactics as opposed to misdemeanor arrests or social services.

Building on these findings, the Jacksonville Sheriff’s Office in the city of Jacksonville Florida became the first police department to experimentally test the differential impact of different policing strategies across hot spots (Taylor et al., 2011). Eighty-three violent crime hot spots were randomly assigned to one of three conditions: 40 control hot spots, 21 saturation / directed patrol hot spots, and 22 problem-oriented policing hot spots. After an experimental period of 90 days, the authors compared the outcomes of the three conditions. Although the results failed to show any statistically significant crime declines *during* the experiment in either the saturation or problem oriented locations, after a 90 day follow up period, street violence declined by a statistically significant 33% in the problem oriented locations. Results from this study indicate that problem oriented approaches in hot spots are more advantageous compared to saturation. Importantly, these efforts require more time to take root.

Utilizing the data collected in Sherman and Weisburd’s (1995) Minneapolis Hot Spots Experiment, Christopher Koper (1995) was able to determine the optimal amount of time officers could spend at each crime hot spots. Specifically, Koper examined the duration police spent at each hot spot *for each site visit*. He then examined the amount of time which passed between the officers leaving the hot spot and the occurrence of the

next crime. Using survival analysis, he was able to discern that each additional minute officers spent in a hot spot increased the amount of time which passed before another crime occurred by 23%. Interestingly, after 14-15 minutes, there were diminishing returns, meaning longer doses of time spent at the site did not lead to greater returns on the amount of time which passed before the next crime. This ideal time frame of 15 minutes is frequently called the “Koper Curve,” an idea not all that dissimilar from one articulated by Sherman that crackdowns need to be, “intermittent, unpredictable, repetitive, and *brief*...on constantly shifting targets” (1990, p.37).

The validity of this finding was experimentally assessed by the Sacramento Police Department (Telep et al, 2012). While officers were not specifically told to employ a particular policing strategy while in the hot spots, they were given a random order to visit, and told only visit each site for 12-16 minutes. Researchers were able to verify the officers rotated approach and time spent using automated vehicle locators. When comparing the difference in differences between experimental and control sites, statistically significant reductions in calls for service and Part I offenses were noted.

Hot spots approaches were also tested in Philadelphia using foot patrol (Ratcliffe et al, 2011). The conventional wisdom at the time was that while foot patrols could improve the community perception of police, and reduce fear of crime, they were unable to reduce crime itself (Kelling, 1981). However, these approaches were not applied in micro settings until the Philadelphia Foot Patrol Experiment. This experiment reported on the work of 200 foot patrol officers randomly assigned to patrol hot spots in the summer of 2009. Target areas experienced a relative reduction in violent crime of 23% when compared to controls. However, these benefits were only experienced in areas with a high

threshold of pre-intervention violence, those hot spots in the top 40 percent of pre-treatment violent crime counts.

It should be noted that these studies are a non-random sample of the research. Thus, drawing conclusions on the effectiveness of hot spots policing based on this research alone would be inappropriate. Therefore, it is necessary to capture a broader scope of the research more generally. Appropriate, results from a two recent meta-analyses of some of the most rigorous hot spots policing studies, including several of the studies previously mentioned, was recently made available by Anthony Braga and colleagues (2008, 2012). Their findings indicate that, “focusing police efforts on high-activity crime places can be used to good effect in preventing crime” (2008, p.23). Seven of the nine studies included in the review found statistically significant reductions in crime and disorder. Additionally, Braga also examined these interventions impact on crime displacement, finding no evidence of the phenomenon in the five studies which permitted examination.

Similar conclusions were drawn in Braga and colleagues 2012 updated Campbell Review. Given the importance of this systematic review’s contribution to the research base, it is worthwhile to discuss in more detail. Campbell Reviews are rigorous and transparent procedures for synthesizing the best research to date on a given intervention or policy, and can thus be said to represent our “best guess” as to the true impact in the general population. In an exhaustive search of fifteen crime databases, past narrative, empirical, and Campbell review bibliographies, searches through works that cited seminal hot spots studies, and hand searches of top rated journals in criminology and criminal justice, the authors identified 4,315 abstracts. Braga and colleagues then filtered

this list down to just 19 which met their inclusion criteria which consisted of studies that were quasi or random experiments, examining interventions that were police-led¹¹, in “units of analysis smaller than a neighborhood or community” (p.13), that measured the impacts of the intervention using officially recorded crime.

Since many studies do not prioritize the outcomes they report on, nor do they report all outcomes examined, Braga and colleagues analyzed the effect sizes using three approaches to help guard against creaming: 1. Overall mean effect size. 2. Largest effect size. 3. Smallest effect size. Regardless of which approach was taken, the authors noted effect sizes that favored the treatment in each instance, with an overall standardized difference in means of .184 (p-value .000), a difference of .276 (p-value .000) using the largest reported effect size, and a difference of .155 (p-value .000) using the smallest. Importantly, their review also compared the effect sizes of hot spots interventions by program type. Braga and colleagues compared five different types of programs: problem-oriented policing, increased patrol (foot or car), drug enforcement operations, increased gun searches and seizures, and zero-tolerance policing, finding that the effect size for problem-oriented policing programs (.232) were twice as large as those for increasing patrol (.113). This is an important advance because while it has long been known that crime clusters in small micro places, it has been less clear what the police should do about it. Evidence from Braga’s reviews indicate that, “the problem-oriented policing approach holds great promise in developing tailored response to very specific recurring

¹¹ Police-led interventions include, “traditional tactics such as directed patrol and heightened levels of traffic enforcement as well as alternative strategies such as aggressive disorder enforcement and problem-oriented policing....crackdown programs were also considered [if they were] focused on very specific places” (Braga et al, 2012, p.13).

problems at crime hot spots...even “shallow” problem solving better focuses police crime prevention efforts at crime hot spots” (2012, p.32).

Indeed, the empirical literature on the effectiveness of geographically focused police-led interventions is relatively strong. A growing body of evidence suggests that interventions in which officers apply problem-oriented tactics (even if shallow), or in rotating random patrols of 15 minutes each, within crime hot spots, may be most impactful. Indeed, the weight of this evidence has partially led prominent scholars Durlauf and Nagin (2011) to conclude criminal justice funding would be better spent by shifting resources from imprisonment to policing. However, as alluded to by Lawrence Sherman (paper presented to the University of Minnesota Law School Robina Institute, 2012),

“There is good reason to extend the hypothesis from the level of hot spots to the level of large areas using hot spots policing. Reason, yes. Evidence, no. The only way to tell whether a policy of hot spots policing will reduce crime is to compare it to a policy of *not* using hot spots policing—across large areas with and without hot spots.”¹²

However, without adequately examining the potential of this policing tactic to cause crime displacement, even a *reason* to generalize may be lacking.

Crime Displacement

While there are a number of criticisms of the hot spots policing approach (Rosenbaum, 2006), perhaps the most commonly articulated is the potential for geographic crime displacement—a spatial shift in crime from the target location(s) to

¹² A similar sentiment is echoed by Robert Sampson in his critique of randomized experiments in criminology and criminal justice (2010).

untreated areas (Barr and Pease, 1990; Eck, 1993; Hakim and Rengert, 1981; Reppetto, 1976). Crime displacement has long been a concern among criminologists and criminal justice practitioners. Almost four decades ago, Thomas A. Reppetto wrote about the phenomenon in an influential article for *Crime & Delinquency* (1976). Since Reppetto's statement of the displacement hypothesis lays the foundation for most empirical assessments of the phenomenon, it deserves further discussion.

First, Reppetto notes that there are actually five types of potential displacement and discusses each in detail: temporal, tactical, target, functional, and territorial. Temporal displacement is a shift in time from when an offender commits their crimes. Tactical displacement is a shift in the methods used by an offender. Target displacement is a shift in the victim. Function displacement is a shift in the types of crimes committed. Finally, territorial displacement is a shift in the location of the offense. It should also be noted that these types of displacement can co-occur. For example, an offender may change their methods, targets, and offenses simultaneously, all of which complicate the quantification of displacement (Hesseling, 1994). While these differences are important, there has clearly been an emphasis on territorial displacement in the contemporary literature.

Second, Reppetto draws a distinction between those interventions which are more likely to lead to crime displacement. Interventions which target the root causes of crime, such as social welfare, can reduce crime in an absolute sense; however, those which merely reduce opportunities or increase risk do not offer the same security of absolute crime reduction. Illustrating the point further Reppetto argues, "A house which is

securely locked or a street that is well patrolled does not lessen an offender's crime propensities in an absolute sense, but only vis-à-vis those targets" (1976, p.167).

However, reducing an individual's motivation for crime is quite difficult given both the ambiguity and complexity of its causes, as well as the difficult task of changing these factors once identified. Those interventions which reduce opportunity or increase risk, which Reppetto dubs "mechanical," are generally more manageable for criminal justice agents to enact. Therefore, Reppetto understands why these types of interventions would be attractive to interventionists. Since these mechanical interventions cannot be omni-present in a community, there will always be a degree of disparity within a given environment. It is at this point Reppetto (p.167) asks the logical follow up question, "Given the differential and no reduction in the offender population [since mechanical interventions do not address root causes], will not the foreclosure of one type of criminal opportunity simply shift the incidence of crime to different forms, times, and locales?" This latter point is important, since most hot spots policing interventions utilize "mechanical" approaches. It would seem then, from Reppetto's perspective, that they are likely to lead to crime displacement since they do not address the root causes of crime.

It should be noted that even when displacement does occur, it may still provide some aggregate benefit. For example, if 100 crimes are displaced into an adjacent control area, but 200 crimes were prevented in the experimental location, there was still a net decrease of 100 crimes. Additionally, these 100 crimes displaced may be less harmful than those 200 prevented, which may also classify as being "benign" (Guerette and Bowers, 2009). Guerette and Bowers argue that benign displacement could reduce overall harm in several additional ways. It could spread the concentration of crime among more

victims to reduce the frequency of repeat victimization, transfer the crime away special populations which may be more vulnerable such as children and elderly, and finally, displace crime where it is less harmful to the community. For example, a drug market may be displaced to a less densely populated area thus affecting fewer denizens.

Malign as opposed to benign displacement occurs when it increases the amount of harm; the opposite process to that described above. It can occur in a number of ways such as when the amount of crime prevented is outweighed by the amount of crime displacement, when the types of offenses are more harmful, such as the reduction of burglaries leading to a displacement of robberies, or for example, when the victims are particularly vulnerable populations.

When the benefits of a place-based initiative outweigh the harms and displaced harms, it can be said to be effective. The challenge rests on being able to quantify both the benefits and harms. The next section reviews how studies of crime displacement typically quantify the harms and benefits, outlines the findings of these evaluations, and discusses the shortcomings of the one approach almost universally used to document displacement—buffer zones.

Crime Displacement Empirical Findings

While all geographically focused interventions ostensibly concentrate their efforts on a relatively “micro” area¹³, the tactics used vary widely. Within the displacement literature, these interventions can usually be classified as falling into either situational crime prevention (Cornish and Clarke, 2003) or policing-led efforts (Bowers et al., 2011).

While these two approaches are not necessarily mutually exclusive, as police-led

¹³ It should be noted that there is some variability between what criminologists consider hot spots and geographically focused crime interventions.

interventions could be considered a way to increase formal surveillance under Cornish and Clark's SCP taxonomy, it provides a way to draw a contrast between those interventions which are largely police-based, such as the 2011 SCI, versus those that are based on changing the physical environment¹⁴. Given the current works focus on police-led interventions, the review of the displacement literature will focus on empirical evaluations of police centric tactics.

Many of the aforementioned impact evaluations of police-led hot spots interventions also examined crime displacement. The collective wisdom from these studies, as well as from systematic reviews and meta-analyses, has led most scholars to conclude that crime does not "just move around the corner."

The Jersey City Drug Market Experiment examined the spread of crime calls to buffer zones (areas immediately adjacent to the drug hot spots) finding no evidence of crime displacement in experimental versus treatment control sites. Indeed, the authors found what has been termed a "diffusion of crime control benefits." Calls for narcotics and public morals had decreased in the experimental buffers compared to the control, despite the lack of increased police presence in these areas. The authors further examined any potential displacement by looking for the emergence of new crime hot spots. Using this approach, researchers did note some evidence of new hot spots, but this type of displacement was more than twice as likely to occur near a control versus experimental location. Thirty-six new hot spots were identified within one block of control locations, compared to 19 new hot spots within one block of experimental locations (Weisburd and

¹⁴ While problem solving efforts in hot spots may end up utilizing SCP tactics, the literature lacks rich information on what officers actually do in these hot spots. Moreover, much of the problem solving is shallow and relies on traditional police tactics (see Braga and Bond, 2008).

Green, 1995). In addition, 18 other newly identified segments were found post-intervention.

However, without being able to follow specific individuals, it is hard to determine whether these increases are due to offenders being displaced from experimental versus control sites. Increases in the control locations could arise from displaced treatment offenders. Moreover, relying on statistical thresholds to identify new hot spots presumes that any displacement which occurs will cluster, when in fact displaced individuals may be displaced stochastically. That total sum of displacement may be high, but if it is not concentrated in the same location, it would be hard to detect using the researchers approach.

In Massachusetts Braga and Bond (2008) used a similar buffer zone approach, examining displaced crime in two block catchment areas around all 34 hot spots. While all calls for service categories (assault, burglary/breaking and entering, larceny theft, and disorder) had small increases in experimental compared to control buffer zones, none were statistically significant. While this may suggest a modest degree of displacement, the authors point out that these small increases do not outweigh the reductions achieved in the treatment locations.

Taylor and colleagues (2011) examined displacement, again, using a buffer zone approach. Researchers examined crime displacement in adjacent areas between 100¹⁵ and 500 feet, finding neither problem oriented policing, or patrol saturation, produced statistically significant changes in UCR property or violent crime. However, problem oriented policing buffer zones experienced a 29% increase in any violence (including

¹⁵ Researchers used a 100 foot initial buffer so it would include parking lots and other larger features which the police in the hot spots likely covered and were thus “treated.”

domestic violence) and 31% increase for street violence calls for service. The researchers argue that the POP intervention made residents more sensitive, more engaged with the ongoing policing efforts, and thus more likely to report crime. Given the unfiltered nature of calls for service, and the high false positive rate, they are not necessarily a valid measure of displaced crime.

In Sacramento, the analysis of displacement was limited, given that many of the control and experimental hot spots were in close proximity of one another. Thus, one to two block catchment areas could not be calculated for most of the hot spots. Of the 83 hot spots in the study, only 11 treatment and 9 controls could be contrasted. While increases were noted in the treatment catchment areas, and reductions in the control catchment areas, none of the differences were statistically significant (Telep, et al., 2012).

Weisburd and colleagues (2006) in Jersey City conducted the first study specifically designed to examine crime displacement, overcoming a number of limitations of prior evaluations (see Weisburd and Green, 1995). The study focused on two street level crime hot spots (one with drug crime and one with street-solicitation for prostitution), relying on a mixture of patrol saturation, chronic offender targeting, physical disorder clean up, and linking prostitutes to community social supports. Similar to most methods use to examine crime displacement, authors relied on a buffer zone approach. However, researchers also relied on a unique combination of data to examine whether targeted policing interventions displace drug crime or prostitution including social observations, arrestee interviews, and ethnographies.

Findings indicate that target locations experienced reductions in crime, and that some of these reductions diffused into the two catchment areas. Importantly, the

qualitative data allowed researchers to examine the mechanisms by which crime was not displaced. Interviews of prostitutes were revealing in that they cited the difficulty it was to simply move their operation to another part of the city. They could not impede on another prostitutes turf and they could not work in areas they were unfamiliar with. Prostitutes need to be familiar with area in order to work there.

Systematic Reviews and Meta Analyses

Perhaps the best synthesis of the police led crime displacement literature is the Campbell Collaboration systematic review by Kate Bowers and colleagues (2011). Systematic reviews use transparent guidelines to select, evaluate, and synthesize the results of a given body of literature. Campbell Collaboration reviews also search for unpublished research to avoid publication bias, rely on at least two reviewers working independently to identify eligible studies, and undergo peer review (Campbell Collaboration, 2013). It is these qualities which make this type of synthesis more objective, especially when compared to narrative reviews.

While not the first review of crime displacement (see Barr and Pease, 1990; Eck, 1993; Hesseling, 1994), Bowers et al., improved on these earlier reviews in a number of ways. First, all the reviews are quite dated given the myriad of research that has been conducted in the 16 years since the most recent review. Second, all the reviews were descriptive in nature, not relying on more common meta-analytic techniques used in many criminological systematic reviews. Third, the weight displacement quotient, a standard statistical tool to measure displacement and diffusion of crime control benefits was lacking in these earlier reviews.

After an exhaustive search of the literature, 44 studies were included for review, of which, 16 contained enough information to be included in a meta-analysis. Results of this analysis indicate that geographically focused policing interventions are associated with statistically significant crime reductions with some evidence (non-significant, but in the right direction) of diffusion of crime control benefits. Among the policing led approaches, problem-oriented policing appeared most closely related to a diffusion of crime control benefits than other tactics.

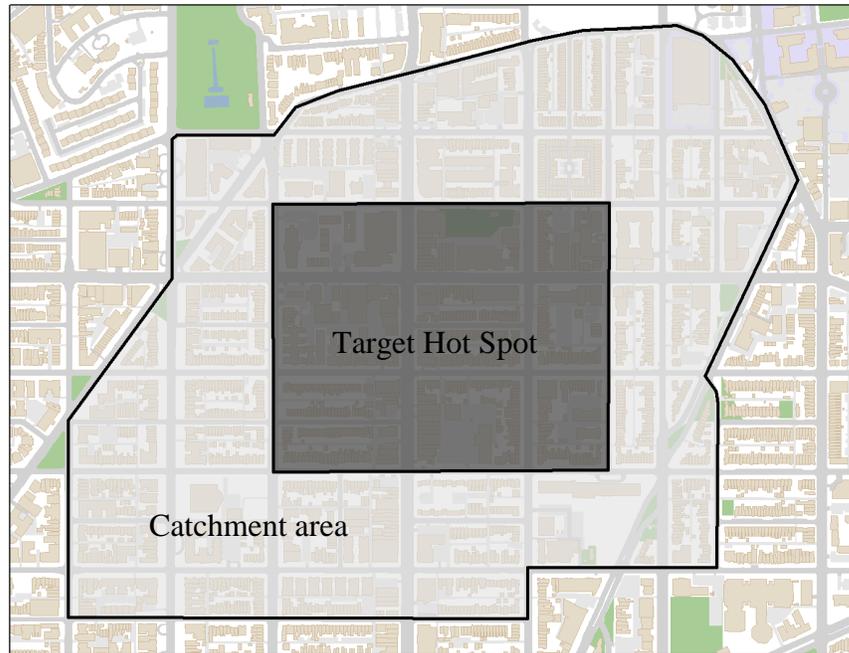
Measuring Crime Displacement Using Buffer Zones

During the first randomized experiment of hot spots policing in Minneapolis Minnesota (Sherman and Weisburd, 1995), officers commonly remarked that crime would, “just move around the corner” in response to the police crackdown. This maxim offered a simple yet testable hypothesis which has been reiterated in some form since Reppetto’s first formal statement of the problem in 1976. In his influential article, he argued that robbers and burglars seemed tied to smaller geographic areas. When examining the crime patterns of individual offenders, Reppetto noted that they all seem to cluster suggesting individuals are not highly mobile. Thus, if crime is to be displaced, it likely will not move far away from the treatment area due to this immobility of offenders. Furthermore, Reppetto discussed how interventions which reduce crime in one neighborhood may cause adjacent ones to, “experience a crime wave” (p.168).

There have been relatively few methodological advances in the study of crime displacement since the 1990s, when the phenomenon started receiving widespread empirical evaluation. With a handful of exceptions, virtually every published study identified in the literature uses this same approach—small adjacent isotropic buffer

zones, sometimes referred to catchment areas, are drawn around the experimental location to “catch” any spillover from the treatment location. Typically, “a buffer is most commonly visualized as a uniform polygon shape that extends around an object” (Ratcliffe and Breen, 2011, p.234).

Figure 1: The Buffer Zone Methodology



While this approach was probably adopted because of its simplicity, there are some technical challenges in selecting an appropriate catchment area. As Weisburd and Green (1995) have articulated, it is a balance of selecting a size that is not so large that it will “wash out” any displacement effect, but large enough to detect such displacement if it in fact occurs. Large crime reductions within the hot spots, which may be statistically significant, are likely to be washed out when compared to totals in the catchment area. For example, Weisburd and Green (1995) noted that a reduction of 49 crime calls in one of the Minneapolis hot spots (see Sherman and Weisburd, 1995), while statistically

significant, would be unlikely to amount to much effect if displaced to a buffer zone with 1,116 crime calls per year.

A second issue also highlighted by Weisburd and Green (1995, p.727) is the “displacement contamination” effect of selecting non-mutually exclusive displacement buffer zones, control sites and or experimental sites. When these sites are close enough in space it makes separating the effects of crime reduction, displacement, and diffusion of benefits particularly thorny (see Telep et al., 2012). This can be easily overcome if the control and experimental sites are far away from each other, but in the end how far is far enough is a had to discern. Similarly, Ratcliffe and Breen argue that buffer zones that are too large will incorporate crime events generated by local contextual factors, not by displaced offenders from the treatment area. Buffers that are too small may miss displaced offenders (or diffusion of benefit effects), and may spill into the control areas if they are both small and proximate to controls (2011). Importantly, when examining displacement or diffusion, the researcher should be cognizant that reductions in the buffer zone may be unrelated the treatment intervention, and instead be a product of crime prevention measures in the buffer zone.

Finally, when selecting a buffer zone natural boundaries must be considered. If a target location is near a river or park, it probably does not make sense to draw a buffer around the treatment area as these natural boundaries may increase the risk and effort of committing a crime. Ratcliffe and Breen (2011) take this a step further, arguing that “perceptual” boundaries, those which are not easily visible like a river or highway, should be recognized when making buffer zone boundary decisions. Buffers which include a break in the social environment, such as a neighborhood of a different

population, or a location with a different gang territory, need to be factored into this selection process.

Weighted Displacement Quotient

A newer and increasingly used technique to measure displacement, the weighted displacement quotient, has been described by its developers as providing, “a systematic way of measuring the geographical displacement of crime” (Bowers and Johnson, 2003, p.300). The WDQ addresses a number of measurement critiques of the standard buffer zone methodology by examining both the potential success *and* displacement of the intervention simultaneously, examining relative changes in crime and displacement, and standardizing the calculation by using crime rates, thus making it possible to compare across interventions.

To calculate a WDQ requires the selection of three areas: 1. The target area where the intervention is employed. 2. A buffer zone estimated to be the most likely location where crime would be displaced and. 3. A control area to provide a counterfactual to the treatment location.

$$WDQ = \frac{B_{t1}/C_{t1} - B_{t0}/C_{t0}}{A_{t1}/C_{t1} - A_{t0}/C_{t0}}$$

A: frequency of crime in intervention location

B: frequency of crime in buffer location

C: frequency of crime in control location

t1: time of the intervention period

t0: pre-intervention time period

1. Over any given time period, buffer zone B will account for a particular proportion of the crime committed within a control area (C).
2. If geographic displacement does occur it should displace from the intervention (A) into the buffer zone (B) that surrounds it; and
3. If displacement does occur, then, relative to the control area (C), crime in the buffer zone (B) should increase while crime in the action area (A) should decrease.

Table 2: Interpretation of Weighted Displacement Quotient

WDQ Value	Interpretation	
WDQ > 1	Diffusion greater than direct effects	Positive net effect of the program
WDQ near 1	Diffusion about equal to direct effects	
1 > WDQ > 0	Diffusion, but less than direct effects	
WDQ = 0	No displacement or diffusion	
0 > WDQ > -1	Displacement, but less than direct effects	
WDQ near -1	Displacement about equal to direct effects	No net benefit to program
WDQ < -1	Displacement greater than direct effects	Program worse than doing nothing

Source: Bowers and Johnson (2003, p.286).

Qualitative Approaches

Finally, it should be noted that at least one piece of research relied, in part, on ethnographies of offenders to study crime displacement. In Jersey City New Jersey Weisburd and colleagues (2006) consulted an independent ethnographer to interview 49 prostitutes in order to provide a non-bias sample of offenders in the targeted areas¹⁶. Interestingly, the ethnographer found that many prostitutes were changing their methods by moving business indoors, utilizing phone or beepers to arrange meetings, quizzing clients, and disguising their own looks.

¹⁶ As opposed to only interviewing those formally processed by the criminal justice system, the authors sought to capture a more generalizable sample by including information on those who avoided arrest.

This seems to indicate a degree of resilience to the offenders, a concept not often invoked in the displacement literature. When police conducted a crackdown on prostitution, the targets of this intervention were able to adapt to a degree and continue their illegal behavior. Therefore, it does not seem all that illogical that perhaps one method of adaptation was to shift their territory to non-adjacent areas. However, the authors of this research are unable to determine this based on their methodology—they only interviewed individuals active in the target locations. Moreover, there were no interviews conducted with Johns to determine if their behavior had changed as well.

While qualitative approaches are important and provide context to the study of crime displacement, the current work focuses on the quantification of crime displacement, by far the most common approach to assessing displacement. However, at least in the context of Weisburd et al., (2006), ethnographic studies provide a degree of support to the notion that crime may be displaced through the resilience of offenders and their ability to adapt their modus operandi.

Buffer Zone Approaches: Limitations and New Directions

The buffer zone approach and other approaches which rely on selecting adjacent areas to measure displacement (WDQ) are only adequate if the sole concern of police crackdowns is their ability to displace crime literally around the corner, typically just a few blocks from the treatment location. This view is an oversimplification of the problem. Scholars have taken the “move around the corner” problem quite literally and have neglected to examine non-adjacent displacement. As Guerette and Bowers have stated, “the proximity hypothesis of displacement is the outgrowth of theories on crime that remain just that, theories that are largely untested” (2009, p.1356). The current work

takes a more nuanced look at crime displacement, by arguing certain types of offenses and offenders, such as robbers, are more displaceable. By focusing on the unique characteristics of these offenders, the places they target, and the impact produced by the intervention under study, the current work is able to develop a broader range of displacement possibilities. While short of developing a theory of crime displacement, the current work links the theories and empirical findings of Situational Action Theory (Wikström et al., 2012) and Routine Activities Theory (Cohen and Felson, 1979) to develop a theoretically and empirically informed set of testable hypotheses regarding the displacement of crime.

Theories of Robbery Placement and Displacement

The coupling of crime to place at what has been termed crime hot spots creates a framework for understanding both the placement and displacement of crime. As documented previously, a growing body of research indicates that much crime tightly clusters in micro-places, that these clusters are “placed” in relation to certain opportunity and social conditions, and that these clusters are relatively stable over time (see Weisburd et al., 2012). These facts suggest there are unique features of these places which attract crime to occur there rather than elsewhere. Therefore, displacement from these locations by governmental actions to lower crime may be, in theory, less likely to occur if one assumes the relevant features of hot spots are unavailable in other areas.

While there is a growing body of research on the placement of crime, less scholarly attention has been given to changes in these locations in reaction to a police crackdown. There are generally two competing hypotheses about the effects of increased threats of apprehension in micro places, neither of which have been formally stated in

clearly theoretical terms. These hypotheses are, simply stated, that the effect of increased threats to apprehend criminals in places will:

Hypothesis 1: Deter crime at the place for a brief time before that effect decays, but not spatially displacing crimes that would have happened without increased threats

Hypothesis 2: Deter crime at the place for a brief time before that effect decays, with some or all of the crimes deterred in that place displaced elsewhere because of the increased threats.

As discussed above, the empirical work on these competing hypotheses generally shows that there is minimal displacement of criminal events into immediately adjacent areas that are within two blocks of the targeted locations (see Bowers et al., 2011). However, to date, no piece of research has tracked individual offenders to look outside this two block box surrounding targeted hot spots. The current work plays the devil's advocate by more closely examining this alternative hypothesis (hypothesis 2) that has been neglected, by asking whether crimes will be displaced beyond these small buffer zones amongst a sample of active robbers, and if so, where such offenses are likely relocated.

Scholars have studied robber's target selection, placement of crime, movement patterns, and motivations (Conklin, 1972; Feeney, 1986; Gill, 2000; Jacobs and Wright, 1999; Matthews, 2002; Morrison and O'Donnell, 1994; Wright and Decker, 1997), but no one has used this information to develop a framework for theorizing about conditions

under which these specific offenders might be deterred or displaced by increased police presence or activity. A more developed theoretical view of the possible relationship of sanction threats to crime placement can attempt to incorporate a broader range of possibilities. Indeed, there is evidence from the target selection research that challenges the micro deterrence hypothesis (Hypothesis 1). This evidence suggests that there are unique characteristics of places which attract crime, that some individuals are highly motivated to commit robberies, that this motivation is likely to endure beyond a police crackdown, and that these individuals have the means to displace their offending from previously active locations that are beyond small buffer zones.

The next section, while short of developing a comprehensive theory of robbery displacement, suggests that as a potential outcome of police crackdowns, displacement is unlikely to be fully captured using small buffer zones. While no such theory exists to guide the current work's more global measurement of robbery displacement, if one did, it would have to address two main issues:

Issue 1: What are the characteristics of places that attract crime and robbery more specifically? [presumably these are the places to which crime would relocate as well]

Issue 2: Are there characteristics of robbers which prevent them from being deterred in the face of a police crackdown, and would these qualities lead them to relocate their offending in non-adjacent ways?

In the next section these two hurdles for developing a theory of crime displacement amongst active robbers are explored. Again, while short of developing a theory for crime displacement, the next section aims to more fully examine such potential. Its method of predicting where robbers might displace their offending is to develop a list of places they are most logically to offend if blocked by police action in areas where they were previously active. To do so, the applicable theories and empirical findings of Situational Action Theory (SAT) (Wikström et al., 2012) and Routine Activities Theory (RAT) (Cohen and Felson, 1979) are leveraged. The section concludes that if displacement is going to occur, it is more likely to happen amongst a group of active robbers who will relocate their crime to locations with a specific set of characteristics. Both SAT and RAT are helpful in examining the two issues crime displacement theory must address. And both are further explored to create a framework for measuring such behavior among active robbers.

Situational Action Theory and Routine Activities Theory

In an effort to link theories of why certain individuals are more crime prone with place-based features that make crimes occurrence more likely, Wikström developed what he calls Situational Action Theory (SAT) (Wikström et al., 2012). This interaction is described as a perception-choice process with two basic constructs: (1) propensity, which depends on a person's level of morality and self-control and (2) exposure to criminogenic environments, which is measured using various forms of social cohesion and informal social control. To test his theory Wikström and colleagues (2012) collected a comprehensive longitudinal data set on 716 randomly selected young people living in the UK city of Peterborough, with interviews of youth, their parents, and life history

calendars over a seven year period. SAT provides strong evidence on the characteristics of places where crime clusters more generally (Issue 1) as well as fleshing out the types of offenders who would likely remain undeterred by police activity (Issue 2). Findings from this work indicate that crime is most likely to occur in situations that lead crime-prone people to come into contact with crime-prone places. SAT helps us understand the characteristics of such places and people. Drawing on the routine activities of robbers helps uncover which of these crime-prone places crime-prone robbers are most likely to target (and presumably relocate their offending), and whether such places are likely to exist outside of the buffer zones used to measure crime.

Routine Activities Theory (RAT) was developed by Cohen and Felson (1979) to explain the increase in crime during the 1960s, a time when social and economic conditions were improving. More specifically, the theory seeks to explain how macro level factors, such as the changing role of women in the workplace, led to micro level changes in a person's or place's daily activities. The theory states that crime is the product of the interaction of three factors: 1. A motivated offender 2. A suitable target and 3. The lack of capable guardians. The theory as originally conceived was largely silent on explaining offender motivation, instead focusing on "the manner in which the spatio-temporal organization of social activities helps people to translate their criminal inclinations into action" (p.589). Such an approach suggests that crime clusters are a result of these different spatio-temporal clusters of opportunities, operationalized as motivated offenders, suitable targets, and a lack of capable guardians. Targets have often been college students walking home alone down a dark street talking on their smart phone. Guardianship within RAT is largely derived from the informal and formal social

control of “place managers,” “handlers” and “general guardians.” Place managers may watch over specific locations such as stores, banks, or transit stations. Handlers such as probation officers or parents may supervise potentially motivated offenders. General guardians such as the police or citizen passers-by may be paid or volunteer to patrol particular street segments (Felson and Boba, 2010).

Cohen and Felson (1979), in introducing RAT, were able to link changes in guardianship and target attractiveness to increases in crime. During the 1960s, when the price of goods per pound rose, and women began entering the workforce in large numbers, there were more suitable targets to steal, such as light portable electronics, and fewer informal social controls or place managers in the home to guard them, since they were increasingly entering the workplace. Findings for RAT have been widely documented beyond this initial introduction (Clarke and Felson, 1993; Roncek and Maier, 1991; Weisburd et al., 2012). In the current work, RAT helps to frame the movement and relocation patterns of robbers specifically, to document where they spend their time, where they target victims due to the spatial-temporal clustering of opportunities, and whether their activity patterns will relocate their offending to areas beyond the two block buffer zones typically used to capture displacement. In what follows both SAT and RAT are further explored to develop specific hypotheses regarding the displacement of active robbers.

Characteristics of Places That Attract Crime (Issue 1)

The work of Wikström and colleagues in Peterborough (2012) provides strong evidence regarding the characteristics of places where crimes cluster in space. Wikström and colleagues label certain places as being criminogenic environments, or places where

conditions exist that encourage certain people to break the law. According to their theory, the degree to which a place is criminogenic depends on its “moral contexts, that is different moral norms and levels of enforcement (through formal and informal monitoring and intervention and their associated potential consequences), which means they differ in the extent to which they encourage or discourage breaches of rules of conduct...” (p.16). To examine the place-based characteristics of crime clusters in Peterborough, Wikström and colleagues collected a wide range of longitudinal data at the neighborhood level of various measures of land usage, social disorganization, crime and disorder. Results from a path analysis in Peterborough found five statistically significant place-based characteristics that are related to crime: (1) social disadvantage, (2) ethnic diversity, (3) residential instability, (4) collective efficacy, and (5) non-residential land usage.

First, social disadvantage (1) is the degree to which a community lacks social and economic resources. It was measured as a factor score of the percentage of an area’s residents who are working class, percentage with no or low educational qualifications, percentage who reside in social housing, percentage unemployed, and percentage who reside in detached houses. Findings in Peterborough indicate that as social disadvantage increases so does the frequency of crime in a location. (2) Ethnic diversity is the degree to which a location’s residents vary in terms of race or ethnicity. Wikström and colleagues hypothesize that ethnic heterogeneity may influence the “social milieu” of a neighborhood by impacting its “social cohesion” and the degree to which behavior is controlled through informal social control (p.176). In Peterborough, as ethnic diversity increases so does the frequency of crime. (3) Residential instability is the degree of

residential turnover in a location. Wikström and colleagues argue that instability may “impede the development of local ties and trust between residents and their neighbors or communities, undermining social institutions and hampering the creation of social cohesion and the efficacy of informal social control” (p.174). Wikström and colleagues found the greater the turnover, the higher rates of crime.

These three characteristics of place (social disadvantage, ethnic diversity, and residential instability) each had a direct impact on crime, but their effects were mediated by collective efficacy (4), which Wikström and colleagues define as “residents’ willingness to intervene for the common good (i.e. their potential to exercise informal social control if needed) as a result of shared expectations and mutual trust in the community” (p.34). Originally conceived by Sampson et al (1997) as a way to explain the mechanism linking structural sources of social disorganization (such as residential instability) with crime in Chicago, low collective efficacy prevents neighbors from acting cohesively to establish and enforce norms within a neighborhood. Similar findings have been noted in other cities such as Seattle (Weisburd et al., 2012).

While each of these factors were related to the frequency of crime by location, the place-based characteristic with the largest impact on crime was (5) non-residential land usage—the larger the proportion of a location’s land that is used in non-residential ways, the more crime. Schools, shopping, or city centers are examples of land uses predicting more crime. Wikström and colleagues theorize these types of settings may have greater numbers of people, and thus more opportunities for crime, per square foot. These places may also attract certain types of people who are looking to commit crime, such as thieves and robbers.

In order to develop a set of testable hypotheses amongst one particular type of crime, this study will examine the active robbers targeted by the 2011 SCI in Washington DC. In framing the research to understand their crime placement and displacement, the next section links the findings in Peterborough (2012) to illustrative and quantitative research on robbery more generally.

Characteristics of Places that Attract Robbers (Issue 1)

To understand where robbers may relocate their offending, it is useful to examine the decisions and methods they use to select their initial targets. If their offenses are then relocated after a police crackdown, they will presumably use similar decisions and methods to select targets if their offenses are relocated. To do so the current work leverages what is known about robbers and their routine activities, integrating this information with previously discussed findings from Peterborough (2012) regarding the places offenders more generally target. Routine Activities Theory helps shape our understanding of how robbers select targets, how this decision-making may be influenced by police action, and how this process may result in non-adjacent displacement. This work is compatible with SAT in that both theories argue crime is the product of interactions between motivated offenders and unique environments containing opportunities for crime that are shaped by the social structure of society. Findings from Peterborough point to specific types of places where crime clusters. By understanding robbers routine activities it helps place them in these crime prone settings, which is where such offenses are likely to relocate.

Routine Activities Theory (Cohen and Felson, 1979) claims that robbery is based, to a degree, on the happenstance shaped by the everyday movement patterns of

individuals (Deakin et al., 2007; Wright and Decker, 1997). Robberies occur when potential offenders come into contact with a suitable target with a lack of a guardian. This intersection of offender, target, and guardian is not a purposive selection, but occurs by convenience as robbers move about their daily lives. This theory has also been referred to as being on “alert” (Jacobs, 2010). Robbers, regardless of their level of motivation, are always on alert for opportunities throughout the course of their normal routine activities.

An examination of the empirical literature on robbers helps develop a picture of their routine activities, and the specific locations and degree to which they will seek out opportunities for crime in the face of a police crackdown. Specifically, there are three characteristics of robber’s target selection, that when viewed within a routine activities context helps develop a framework for measuring their displacement: (1) effort, (2) risk, and (3) reward. When integrating these findings with those in Peterborough, a more developed picture of where robbers may relocate their crime emerges.

(1) Effort

The first characteristic is effort or the amount of time and resources required to travel to a given location to offend. Robbers who are more transient probably come into contact with more opportunities for crime, *ceteris paribus*. The majority of empirical evaluations of geographically focused policing to date presume that individual offending patterns are local in nature, thus any displacement will be captured using the aforementioned buffer zone approach (Weisburd et al., 2006). Indeed, offenders do tend to favor targets near their home, but this choice is *relative*, and seldom at the scale which would allow displaced offending to be captured within a two block buffer zone. Evidence

suggests that robbers' routine activities allow them to travel beyond these small buffer zones, which is one primary issue to address in developing a theory that could explain non-adjacent spatial displacement.

A number of studies have documented the degree to which robbers will travel from their homes to offend (Capone and Nichols, 1976; Van Koppen and Jansen, 1998; Wiles and Costello, 2000). For example, Van Koppen and Jansen (1998) studied 434 robberies amongst 585 robbers that were convicted in a Dutch trial court in 1992, finding that close to 70% traveled over 2 kilometers (1.24 miles) to commit their crimes. Similarly, Capone and Nichols (1976) studied 642 cleared robberies representing 825 robbery trips that occurred in the Miami metropolitan area in 1971, finding that close to 70% of all trips were over one mile, with the average trip being 2.47 miles. These distances must be viewed in context with the buffer zones that are usually constructed to capture displacement. The typical buffer zone analysis has a two block radius (see Bowers et al., 2011), which in Washington D.C. would translate to about 1000 feet or .189 miles. Many offenders appear willing to travel beyond the micro geography that surrounds their home (Capone and Nichols, 1976; Van Koppen and Jansen, 1998; Wiles and Costello, 1998). Thus, much of their displaced offending may not be captured.

This distance is much greater than the typical buffer zones used, but these travel patterns are not so great to preclude their being measureable within the boundaries of Washington D.C. Wiles and Costello, for example, examined burglary and taking of autos without owners consent (TWOC)¹⁷ data from South and North Yorkshire police forces, finding that over 50% of all offenses were within two miles, and nearly 70%

¹⁷ TWOC includes taking without an owner's consent, aggravated taking without an owner's consent, and theft of a motor vehicle.

within three. Importantly, the low levels of effort offenders are willing to put into travel from their home tethers the majority of them to locations within Washington DC¹⁸. Indeed, it has been a long documented finding that robbers and offenders more generally follow a distance decay pattern when selecting targets (Conklin, 1972; Van Koppen and Jansen, 1998). Therefore, while many are likely to offend beyond small buffer zones, the probability becomes increasingly small as the distance away from their home increases, to the point where offending for many of the robbers in this study beyond the D.C. city limits is unlikely. This evidence does not lead to any specific hypotheses regarding the relocation of robbers' offending. It does, however, suggest that the vast majority of crime displacement studies to date are unable to capture the full spectrum of crime displacement due to the methodological limitation created when measuring such behavior within small two block buffer zones.

Effort is also related to the degree with which one is familiar with a place. Offenders whose routine activities place them in contact with a large number of opportunities will require less effort to leverage them compared to offenders who are less wide-ranging. Thus, mobility helps offenders construct opportunities. Some will “bank” potential “deposits” of suitable targets where capable guardians are lacking. Indeed, evidence suggests that a robber's ability to commit crime and displace their spatial selection is bounded by their degree of familiarity with a place (Deakin et al., 2007; Reppetto, 1976; Wiles and Costello, 2000; Wright and Decker, 1997). According to interviews of robbers conducted by Wright and Decker (1997), robbers did not select opportunities at random, but were bounded by locations they were already familiar with.

¹⁸ See Chapter 4.

Nearly all the robbers interviewed explained they chose places they were “acquainted” (p.74) with where they knew the points of entry and exit.

While offenders may not travel to a specific location for the purpose of committing a crime, they are constantly on the lookout for a good opportunity. For example, when examining the reasons why the 70 Sheffield-based convicted burglars and car-jackers interviewed by Wiles and Costello (2000) were initially in the area where they ultimately offended, close to 70% said they were there for reasons other than offending. Indeed, approximately 30% (of the 70%) claimed they were in the area to visit friends, for shopping or leisure, or just happened across the target by chance. While this sample was not exclusively amongst robbers, it does suggest the opportune nature of many criminals which further suggests that they look for opportunities for crime during the course of their routine activities. This seems supported by Wright and Decker’s interviews with burglars who claim to always be “half looking” (Wright and Decker, 1994, p.79). This is also true among the robbers they interviewed, who would encounter opportunities for crime during the course of their everyday routine activities (1997). Understanding the routine activities of robbers is thus important when attempting to develop a framework for studying crime displacement.

Robbers’ routine activities tend to place them in locations near their current and previous homes. Using a stratified random sample of 4,410 offenders arrested for burglary, theft from a car, robbery, or assault in The Hague, Bernasco (2010) examined the impact of offenders’ residential histories on the probability of choosing such past locations for crime. He found that offenders are more likely to choose locations where they currently live (based on postal code) or have lived in the past relative to similar areas

where they have never lived. Specifically, robbers are over four times as likely to choose their current home area compared to areas they have never lived, and similarly are nearly three times as likely to choose an area they formerly lived compared to areas they have never lived.

This research indicates that if robbers are blocked from committing a crime in one of the SCI areas, they are more likely to select their next offense in places they are familiar with through their routine activities. This may include their current and previous homes, and perhaps locations where they have previously been arrested or committed crime. These places may also serve as a proxy for the places they generally “hang-out,” since many offenders are stopped and arrested by the police in such places. A person’s routine activities and the degree to which they encounter opportunity are not static. When offenders move their residences they develop new travel patterns and familiarities, but that does not necessarily “knife off” their knowledge and ability to leverage past spaces and travel patterns for offending.

These findings are similar to those amongst offenders more generally in Peterborough, where a large percentage of young offenders’ crime was located near where they lived. Among all violent offenses, such as robbery, nearly 56% were committed within 1000 meters of a young person’s home (Wikström et al., 2012, p.243). While other more distant locations are also targeted, as discussed below, a prime location to search for displaced robbers is near where they live, where they previous lived, or where they have been arrested or previously offended.

Offense type displacement is also a common theme in robbery ethnographies (Deakin et al., 2007; Wright and Decker, 1997). Offenders frequently cite their

willingness to displace their behavior to other crimes when robbery opportunities are blocked. While the robbers in Wright and Decker expressed their desires, rationales, and expertise in committing robbery, many argued that in times of “financial desperation,” which indeed classifies a large number of robbers, they might select viable alternatives such as theft, motor vehicle theft, or burglary. Moreover, there is evidence from a range of studies which supports the cafeteria style nature of offending (Piquero, 2000; Piquero et al., 2007; Sampson and Laub, 1993). Thus, the current work examines not only whether active robbers displace their behavior to robbery elsewhere, but whether they displace any instrumental offending both locally and non-locally. Based on the aforementioned empirical findings on robbers’ target selection in The Hague (Bernasco, 2010), and the ethnographic work on offense type displacement (Deakin et al., 2007; Wright and Decker, 1997), the following two hypotheses on crime displacement are derived:

Hypothesis 1: Robbers respond to a police crackdown in one place by relocating their offending to places they formerly lived or currently live, and locations they have previously been arrested or previously committed a crime.

Hypothesis 2: Individuals who are blocked by increased police patrols from committing robberies in one location will displace their behavior to other instrumental offenses both locally and non-locally.

Opponents of the locational displacement hypothesis often argue that because most people's routine activities are limited, they are not and cannot become familiar with new places and opportunities easily. There is evidence to the contrary. The likelihood of finding another opportunity may be directly related to number of places with which a person is familiar. A person may be half-looking, but if this occurs in the same two locations, their likelihood of finding another opportunity is smaller when compared to an offender looking in 10 places, *ceteris paribus*. Importantly, beyond examining the reasons for being in the area, Wiles and Costello (2000) also identified the extent of offenders' familiarity with places. Over half of offenders interviewed had lived in more than two neighborhoods, saying they were familiar with 14 of the 23 areas of the city shown to them on a map, with the city center being known by all offenders. At least seven areas were known by over 66% of offenders. This suggests that an offender's routine activities may not be as limited as suggested by studies which rely on buffer zones, thus providing these individuals with the familiarity of alternative opportunities for crime that enables them to displace there offending.

In addition, while the robbers interviewed by Wright and Decker (1997) chose locations with which they were familiar, 32 of the 81 interviewees were highly transient, rarely sleeping in the same place longer than a few consecutive nights. Offenders preferred this nomadic lifestyle, with many of them having a number of resting spots at their parents, girlfriends, and friend's houses. If this highly mobile lifestyle is generalizable beyond 32 robbers in St. Louis—which is unknown—it is likely that at least some offenders are familiar with more than a handful of places in the city and thus may be better situated to relocate their operations in response to a police crackdown.

Even amongst those offenders who are not highly transient, it is still possible that highly motivated offenders can learn of new opportunities relatively easily. Deakin and colleagues (2007) interviewed 20 robbers incarcerated or under community supervision, finding that many of them had a “patch” they preferred to operate where they believed there would be a crop of suitable victims. In many instances these victims were students or individuals who appeared affluent. However, while offenders favored their patch, they also indicated the ability to quickly become familiar with places previously unknown, suggesting the familiarity of place is an easy barrier to overcome. Of the robbers “still active” (p.64) at the time of the interviews, they acknowledged noticing the presence of police when police held campaigns targeting hot spots. They also said, however, that it did little to deter their offending. This may merely be bravado, which is why the current work attempts to empirically test such claims. Indeed, several offenders commented they could easily travel to other locations to commit robberies that were policed less, or simply displace their offending to burglary. While acting on such claims may be related to the degree to which robbers are crime prone, the analysis of the effort needed to displace criminal behavior seems plausible. It at least provides some basis for understanding how robbers select targets, how familiar they are with many areas of the city, and how they can presumably quickly learn of new opportunities for crime with little effort.

(2) Risk

Risk, as theoretically perceived by a motivated potential offender, is the probability that an individual will be recognized by a capable guardian such as a police

officer or will stand out in some other way, calling attention to their movements and behavior (Felson and Boba, 2010). Regardless of how familiar a person is with a given place, or the degree to which they are willing to travel from their home, they prefer to offend in locations where they blend in. Offenders feel the need to fit in to the location they are targeting, believing it reduces suspicion and red flags amongst would-be guardians who are likely to report their activity to the police. Additionally, fitting into the natural backdrop of the location affords an offender the necessary time to become familiar with the targets more intimately if necessary. Guardians cannot be capable if they are unable to recognize a robber or moreover, unusual behavior, amongst themselves. Robbers often cite sticking to places with a similar social and racial makeup to blend in (Wright and Decker, 1997).

These claims have been tested empirically. Of the 75,078 geocodable robberies in Chicago between 1996 and 1998, Bernasco and Block (2009) examined 18,017 offender-offense robbery arrests, finding a preference toward choosing locations with social characteristics similar to their own. When racial and ethnic dissimilarity between an offender's home location and a location with potential targets change from being completely similar to dissimilar, the odds of them picking this location decrease by 58%.

While the mechanism is different, this robbery-specific finding and hypothesis is in line with the results in Peterborough—locations with a higher percentage of working class, low educational qualifications, subsidized housing, and unemployed population had higher rates of crime (Wikström et al., 2012, p.203). In Washington DC and amongst the areas and robbers in the current study, these are indeed locations that are high in social disorganization (see Appendix 5) and likely have low collective efficacy. In other words,

the locations that are high in social disorganization are likely the very same locations robbers in the current cohort will “fit in.” Therefore, robbers may believe the risk of apprehension is lower and thus displace their offending to areas with a similar economic and racial background as their own because they “fit in.” They may also choose these locations, as SAT implies, because they are socially disorganized and thus unable to establish the social norms and informal social control necessary to deter crime.

Hypothesis 3: Robbers faced with a police crackdown will relocate their offending to areas with a similar economic and racial background as their own, which are areas high in social disorganization

(3) Reward

Robbers choose locations where they are likely to find suitable targets such as victims who carry cash and other valuable goods (Deakin et al., 2007; St. Jean, 2007; Wright and Decker, 1997). Places near ATMs, check cashing outlets, pawn shops, and bars have been linked to an increase in robberies (Roncek and Maier, 1991). Indeed, the “most popular” sites selected by robbers in Wright and Decker’s sample were around check cashing places and ATMs (p.77). Similarly, in an examination of Chicago Police Beats, St. Jean found that robbers primarily targeted locations where cash transactions were the norm (2007). College students are viewed as being the best targets, because they were likely to be carrying cash or other valuable goods, likely to be intoxicated, and less likely to resist or call the police (Deakin et al., 2007; Wright and Decker, 1997).

Similarly, in Wikström et al (2012), the place-based characteristic with the largest impact on crime was non-residential land usage. These are places which attract people for, “shopping, eating out, consuming alcohol, and other pastimes (e.g. going to the cinema, bowling, ice skating (p.295).” In Washington DC these would be places like Chinatown, which contain a similar set of activities and concentrations of people. Findings from Peterborough indicate the “vast majority (p.243)” of offending by youth occurred in city centers, which importantly, attracted youth from all over the city. These are places that likely contain the opportunities which attracted robbers interviewed by Wright and Decker and found in the empirical work by Roncek and Maier (1991). The evidence from Peterborough (2012) also indicates that these types of settings most likely involve unstructured activity, which they found to be directly related to crime. Indeed, nearly all youth crime occurred during semi or unstructured activities, which are often concentrated in city centers. Therefore, it seems reasonable to suggest the following:

Hypothesis 4: Areas within 1000 feet of a bar, ATM/bank, liquor store, or college campus, are more likely to attract displaced robbers.

The previous section developed four hypotheses regarding the likely relocation of robbers if they were to displace their offending both in adjacent and non-adjacent ways in the face of a police crackdown. However, these characteristics of place are only one of two pieces needed to develop a framework for understanding and testing the displacement of active robbers. As Wikström and colleagues have documented, crime is the product of an interaction between a person’s crime propensity and the criminogenic

environment. The rate of crimes per 1,000 person hours in Peterborough was greatest when high risk youth (propensity) spent time in high risk environments (criminogenic environments). Importantly, “young people with a low crime propensity did not offend under practically any circumstances” (p.363). Thus, based on SAT it can be hypothesized that displacement will only occur if a person’s propensity toward crime is relatively strong and that such a person comes into contact (or interaction) with criminogenic environments. This interaction is similar within RAT, where areas with a lack of capable guardians and presence of suitable targets must come into contact with a motivated offender (Cohen and Felson, 1979). Beyond documenting the types of criminogenic places where crime and specifically robbery concentrates (and is thus most likely to relocate), it is necessary to examine whether robbers contain enough crime propensity or motivation to relocate their offending in the aforementioned ways.

Characteristics of Robbers Who Will Relocate Their Offending (Issue 2)

Police crackdowns arguably re-shape the opportunity structures which have supported crime in the past. For criminal events to be displaced in response to a changed opportunity structure, offenders must have sufficient motivation to deviate from their “normal” offending patterns. Moreover, these targets must exist, and must not require a more elaborate skill set or more intensive level of effort. These requirements can be inferred, for example, from the changes in suicides in England and Wales, which took a dramatic drop in the 1960s and 70s. This drop has been explained by the removal of carbon monoxide from the public gas supply. While method displacement to hanging or poisoning was still available, no relatively quick and easy method such as domestic gas existed (Clarke and Mayhew, 1988). Thus, the former suicides were motivated enough to

take advantage of their gas stove, but not so motivated or skilled to hang or poison themselves.

For robbers to displace their offending, they must be motivated enough to continue offending in the face of a police crackdown. The motivation necessary for displacement to occur is explored in the next paragraphs. By drawing largely from ethnographies of robbers both on the street and incarcerated, a wealth of information regarding what has been referred to as “the immediate social context in which offenders construct criminal decisions” (Hochstetler, 2001, p.737) is provided. The goal of this section is to deduce whether robbers targeted by the SCI have enough crime propensity or motivation to relocate their offending. Understanding a robber’s motivation helps build a case for testing their displacement.

Offender motivation is often neglected in the criminology of place and frequently assumed to be a given if the right set of situational inducements are present. For example, routine activities theory *assumes* offenders are motivated, and instead focuses on the presence of suitable targets and capable guardians (Cohen and Felson, 1979). Crime will only occur if a location has suitable targets and a lack of capable guardians in the presence of a motivated offender. Luckily, more information can be leveraged from SAT. Wikström and colleagues argue that a person will choose to break a law if the opportunity arises *and* that person has a high crime propensity, which is determined by their degree of morality and self-control. Morality is the degree to which it is important to a person to obey laws more generally (and with respect to specific actions such as violence) and the strength with which one adheres to these beliefs—as indicated by any shame or guilt they would feel if they were broken. Whether a person can maintain self-control depends on

their executive functioning abilities and incident- specific factors such as their degree of intoxication or emotional state.

While the degree of morality and self-control of offenders in the current study cannot be directly measured, it may be a moot point. It can be argued that being an active robber likely already qualifies them as crime-prone according to SAT. Therefore it may be useful to re-frame SAT's crime propensity in terms of whether it is maintained in the face of the SCI crackdown blocking opportunities. While all active robbers selected in the current work arguably are already crime prone, how strong are these beliefs and how strongly will they adhere to them?

There is little research on what robbers *say* they would do in the face of a geographically focused police crackdown (see Deakin et al., 2007 for an exception). Therefore, the next section attempts to *hypothesize* what they would do before empirically testing changes in their *actual* behavior. These hypotheses draw on evidence that is consistent with the displacement hypothesis, for the sake of framing and testing these statements. This research suggests that robbers are motivated to commit their crimes for a variety of reasons, and for many, this motivation seems pressing, enduring, and unlikely to be repressed by a police crackdown. These offenders are likely the most displaceable. Indeed, this evidence suggests that many robbers are not deterrable in the face of a police crackdown, and will merely relocate their offending to new locations. The following section outlines three primary motivations amongst robbers which speaks to their inability to be deterred: (1) money, (2) drugs and the partying lifestyle, and (3) excitement.

Money for Life's Essentials

Robbers often cite money as a primary motivation (Conklin, 1972; Feeney, 1986; Gill, 2000; Jacobs and Wright, 1999; Matthews, 2002; Morrison and O'Donnell, 1994; Wright and Decker, 1997). Indeed, through interviews of 86 active robbers, Wright and Decker (1997) noted that their sample committed their offenses out of a "pressing need" for cash. Moreover, many "complained bitterly about the constant pressure of bills," with several of the individuals interviewed by Wright and Decker citing specifically using the proceeds to pay bills that were often well past overdue (p.43). Similarly among the 113 northern California robbers examined by Feeney (1986), many "stressed the difficulty of their situations" (p.55) further citing they were "desperate" (p.57). This is also true for the 340 convicted armed robbers Matthews (2002) examined, who noted that the acquisition of money was their "main objective (p.32)."

Table 3 Motivation for Robbery¹⁹

	Wright and Decker (1997) n=81²⁰	Feeney (1986) N = 82²¹	Nugent et al (1989) N=110
Money	81	64	74
<i>Drugs, Alcohol, Gambling</i>	40 of 59 ²²	22	32
<i>Life's Necessities (Food / Shelter / Goods)</i>	19 of 59	29	23
<i>Status enhancing</i>	15 of 59		
<i>Other</i>		13	19
Excitement and other psychic rewards	1	6	
<i>Other</i>		29	36

Money for Drugs

Often the money obtained is used to support a substance abuse problem, which usually far outstrips a person's ability to support through legal employment (Conklin, 1972; Feeney, 1986; Shover, 1996; Tunnell, 1992; Wright and Decker, 1997; Wright et al., 2006). Wright and colleagues (2006) noted that offenders in their sample frequently cited the need for money, but that many cited this need for purposes other than purchasing food or paying bills. Amongst their sample of 27 incarcerated robbers in Wales and England, 25 mentioned robbing to get money to buy drugs and 20 to buy alcohol.

¹⁹ Totals may not add up to 100% as some offenders indicated multiple reasons for committing their crimes.

²⁰ Of the entire sample interviewed by Wright and Decker, 81 made reference as to their motivation.

²¹ Adults only.

²² Of the 80 individuals who said they committed robberies for the money, 59 indicated what they did with the proceeds.

Jacobs (2000) was able to identify 29 active robbers in St. Louis who targeted drug dealers as robbery victims as a means to both obtain cash to purchase illicit mind-altering substances as well as to obtain drugs from the dealers directly. Offenders often cited this need for drugs as constant and pressing throughout the day, with the craving wholly consuming their lives and only worsening as their tolerance increases over time. The offenders interviewed by Jacobs often did not even conceive of a legal means to obtain the money to support their habit, as their neighborhoods were often overrun with an ample supply of drug dealers and other opportunities for a quick score of cash and drugs. As one offender interviewed stated, “you don’t have to made your mind up, your mind already made [*sic*].” (p.25).

This evidence suggests the degree to which some robbers are caught up in their drug usage and a cycle of crime. It is clearly illustrated in one of the United States’ most prolific bank robber Eddie Dodson, who robbed over 60 banks in the mid-1980s to support a drug habit (Rehder and Dillow, 2003). This class of robbers, who desperately need money, are not likely to stop until this need is met.

Illegal v. Legal Means

Robbery is also likely to be the primary means many of these offenders have (or believe) to obtain the money they crave, often filling in the void of legal income. Many robbers are unemployed or underemployed, with poor job prospects given their limited education and unstable employment experience and history. Of the 113 robbers from northern California examined by Feeney, no juveniles and only 20% of adults who said they robbed to obtain money actually had a job, most of which were part-time low-paying

positions (1986). Moreover, robbers often rejected legal means to obtain this money, believing robbery was much more lucrative (Jacobs, 2000; Morrison and O'Donnell, 1994). And despite the associated risks, robbers were often happy with the amount of money they obtained. In a sample of 100 incarcerated London robbers, approximately 54% noted that the money obtained was greater than or equal to what they expected to obtain. Whether the money they obtained was in fact equal to or more than what they expected does not necessarily matter; what may matter most is what offenders believe they will obtain, which is likely to sustain their offending. The offenders examined by Morrison and O'Donnell believed their robberies were profitable and because of this may be the most motivated to continue their offending.

Many robbers are pressed for cash and likely have few legitimate avenues to fulfill this need. This motivation is not likely to be deterred or resolved through an arrest focused police crackdown. The 2011 Summer Crime Initiative was not focused on providing employment services through certifications, internships, resume building, or work-force development more generally, nor did it provide offenders with addiction treatment. For those robbers who need jobs, and indeed, there are many, this need is likely to remain during and after the SCI. Thus, this group of offenders is likely displaceable.

Keeping Up Appearances and The Street Culture

Individuals also use the proceeds they obtain from robbery to maintain a particular standing they have become accustomed to through “non-essential status enhancing items” (Wright et al 2006, p.8). Offenders examined by Wright et al

commonly robbed individuals of their cars, gold, and designer clothes which they used to impress others and inflate their own self esteem. These goods gave them a certain reputation amongst their friends and in the neighborhood more generally that they would maintain through more robberies. Similarly, in interviews conducted by Conklin (1972), many of the robbers indicated they used the proceeds to purchase nice clothes and other “little extras” which would indicate to their friends and others that “they were doing alright” (p.69).

For many robbers the money obtained from their crimes would often not last long. Indeed, many offenders cited going on binges of food, drugs, alcohol, and women until the money was gone. One convicted robber interviewed by Matthews (2002) said the aim of robbery was to “earn it and burn it” (p.32). Robbers often get caught up in this lifestyle that values the possession and flaunting of material goods obtained through robbery. Offenders deeply committed to keeping up appearances are probably less deterrable, but smart enough to relocate their offending in the face of blocked opportunities and increases in the risk of apprehension.

Excitement

Finally, a small proportion of offenders cited the psychological rewards that come from robbery, notably the excitement and thrills gained when committing the crime (Katz, 1988; Wright et al., 2006). Wright et al 2006 noted that offenders cited the pleasure they got when intimidating and controlling their victims. This “buzz” (p.9) was also obtained in the fighting that would sometimes ensue when a victim resisted, where the robbery would find pleasure in assaulting the victim. Similarly, while only the

primary motivation for one robber interview by Wright and Decker (1997), several noted psychic rewards as being an ancillary benefit. Indeed, while obtaining money was the ultimate goal for most of these robbers, they too enjoyed dominating and frightening their victims (p.56).

Motivation Summary

The degree to which an offender is motivated is likely a strong indicator of whether robbers will be un-deterred by police crackdowns and thus relocate their offending. While these motivations are varied, evidence suggests that certain robbers are strongly motivated to commit robbery and may be the most displaceable. Specifically, robbers with a strong, immediate, and pressing need for cash, robbers deeply committed to a street culture that values material goods, quick scores, and a loose accounting of money, and robbers who gain an emotional satisfaction from their crime, are most likely to displace their offending. Robbers appear to be strongly motivated to commit crime and may thus be more displaceable than individuals who are prone to fighting, vandalizing, or loitering.

Motivation cannot be directly measured through surveys of self-control and morality. Given the criminal history of the population under study, however, each robber likely contains varying degrees of situationally-specific crime propensity to relocate their offending. Moreover, there are certain characteristics of place and offender decision making which help shape crime displacement's spatial distribution. Offenders are most likely to displace their behavior to locations where they can fit in, locations where they have some level of familiarity, locations where they do not have to travel terribly far

beyond their routine activities, and locations where there are suitable targets. Based on these target selection criteria the current work developed a number of testable hypotheses regarding the displacement of robbers in the face of a police crackdown.

To conclude, the current work proposes to test a number of hypotheses (renumbered from above) both regarding the impact of the 2011 SCI and the potential diminution of that impact by displacement of all kinds.

Hypothesis 1: The 2011 SCI will reduce robbery offenses in the target locations relative to controls during the three month treatment period

Hypothesis 2: These impacts will decay soon after the crackdown ceases, to the point where treated and control sites will exhibit statistically indistinguishable levels of robbery

Hypothesis 3: As a result of these reductions in robbery, crime in buffer zones immediately surrounding the SCI targeted sites will experience increased levels of robbery and instrumental crimes relative to control buffers, but show no appreciable differences when examining crime in its totality

Hypothesis 4: When tracking a cohort of active robbers, those targeted by the SCI will displace their behavior in ways unable to be captured within a two block buffer zones. Places such non-adjacent behavior is most likely to occur includes: areas within 1000 feet of a bar, ATM/bank, liquor store, or college campus; areas

with a similar economic and racial background as their own, which are areas high in social disorganization; areas they formerly lived or currently live, and areas they have previously been arrested or previously committed a crime.

Chapter 3: Description of the Study City and Intervention

The city of Washington D.C. covers approximately 68 square miles and is situated at the confluence of the Potomac and Anacostia rivers. In 2010 the city had a population of approximately 601,723, an increase of five percent since 2000, the first increase since the 1950s (United States Census). The District has a diverse population with over 60% constituting a racial minority group, but this population has a degree of segregation, with a disproportionate amount of Whites living in Ward 3, west of Rock Creek Park, and similar disproportions of African Americans living in Wards 7 and 8, east of the Anacostia River.

Washington DC is not unlike other major cities included in the hot spots displacement literature. When comparing DC to a select group of cities with a well cited and well-designed study of hot spots policing (Philadelphia (Ratcliffe et al., 2011), Sacramento (Telep et al., 2012), Jacksonville (Taylor et al., 2011), Lowell (Braga and Bond, 2008), Jersey City (Weisburd and Green, 1995; Weisburd et al., 2006), Minneapolis (Sherman and Weisburd, 1995), Kansas City (Sherman and Rogan, 1995), and Indianapolis (McGarrell et al., 2001), D.C. shows few unique features (Appendix 4: Hot Spot City Comparison).

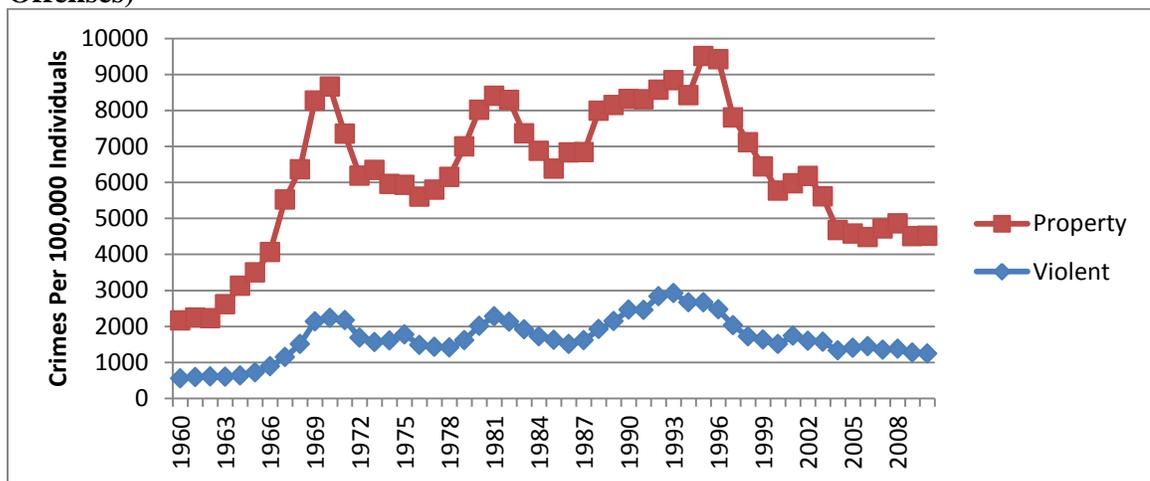
Of the nine cities selected DC ranks 4th in population, 3rd in density, 6th in land area, 3rd in % of the population with at least a high school degree, and 3rd in % of the population below the poverty level. However, DC is the only minority majority city, with just over 50% of the city's population being African American. It has the highest median household income, and has the largest percentage of its population with at least a Bachelor's degree. It is important to note that these data only speak to city-wide

aggregations, and offer no information about the contextual features of the micro-places targeted by police. This level of analysis is explored in Chapter 4.

Crime

Crime in the District has mimicked that of many other large cities in the United States over the past few decades. Violent crime rose to a peak in the early-to-mid 1990s partly fueled by the crack epidemic, and then steadily declined (Johnson et al., 2000). Once labeled the murder capital of the United States, DC is in the midst of an economic and re-development boom. It is hard to travel to any part of the city without seeing a skyline filled with cranes. Indeed, according to the Office of the Deputy Mayor for Planning and Economic Development (2012), there is currently more than 60 billion dollars in commercial, residential, and institutional projects that have been constructed, planned, or proposed in the District of Columbia. One area of improvement often highlighted by the Metropolitan Police Department is the record lows in homicide in recent years. For example, in 2011 there were 108, the lowest number since 1963.

Figure 2: Washington D.C. Property and Violent Crime Rate 1960 – 2010 (Part I Offenses)



Source: Federal Bureau of Investigation Uniform Crime Reports

Metropolitan Police Department

MPD is both a large and diverse police department with 3,814 sworn and 488 civilian personnel in 2011. While both the number of sworn personnel and budget were down approximately 2.5% from calendar year 2010 – 2011 (MPD Annual Report, 2012), in terms of full time sworn personnel, the Metropolitan Police Department is still the six largest local force in the United States, and has more officers per capita, than any other force in the top 50 (Reaves, 2011). In 2011 23% of its sworn personnel were female and 60% were African American. MPD is also home to one of the few female Police Chiefs of a large urban police department. According to a 2008 survey conducted by the National Center for Women and Policing, less than 2 percent of the total number of chiefs was female (2013).

Like almost all police departments in the United States MPD is organized hierarchically with a Chief of Police at top and five Assistant Chief's immediately below who oversee a number of specialized units such as internal affairs, professional development, homeland security, patrol services and school security bureau, and strategic services. MPD divides the management of the city into 7 districts with each District being further subdivided into at least five police services areas for a total of 46²³.

Washington D.C. is also home to more law enforcement agencies than perhaps any other city in America. Beyond the Metropolitan Police Department, a number of other agencies have jurisdiction in the District including the District of Columbia Protective Services Police Department, Federal Bureau of Investigation Police, Metro

²³ On January 1, 2012 MPD realigned patrol-service boundaries due to an imbalance in the workload of patrol. Boundaries were realigned based on an evaluation of crime, calls for service, economic development and road-construction plans, and community concerns. Based on this evaluation the number of police service areas expanded from 46 to 56.

Transit Police Department, Military Police Corps, Smithsonian Police, Supreme Court Police, United States Capitol Police, United States Marshals, United States Mint Police, United States Park Police, United States Secret Service, United States State Department Diplomatic Security Service, and Washington National Cathedral Police. While this makes the study of policing in the District complex, the Metropolitan Police Department is the flagship department, with all arrests going through their intake processing unit. Thus, any arrest for DC Code violations, including UCR Part I and II offenses, will be captured by MPD and included in the current analysis.

Metropolitan Police Department Summer Crime Initiative

On May 1st, 2011, the Metropolitan Police Department launched the Summer Crime Initiative, codenamed, ICE (Increased Community Enforcement). The 2011 Summer Crime Initiative sought to reduce violent crime, gun-related offenses, and drug related offenses, through a targeted enforcement approach within crime hot spots. Beginning in 2010 the initiative has become an annual summer crime reduction tactic for Chief Lanier and MPD.

Management

During the 2011 SCI, an Inspector was placed in charge of each of the five target locations and was responsible for managing the intervention in that hot spot. While the Inspector had a degree of discretion as to the response within their area, they generally relied on patrol saturation and access to specialized units such as canine, swat, and narcotics to suppress crime. Each Inspector placed a team of officers on rotated 12 hours shifts 24 hours a day seven days a week within each of their hot spots. While these

officers were free to respond to calls for service outside of the designed hot spot, they were given maps of the areas and instructed to preserve the integrity of these boundaries as much as possible.

Identification of Crime Hot Spots

In order to identify hot spots of crime, MPD relied on Kernel Density Estimation (KDE) techniques. Kernel density estimation is a technique commonly used in the identification of crime hot spots. The technique places a symmetrical surface over the study area, examines the distance of each point (crime) to each cell, and calculates a density based on a mathematical function (Levine, 2010). Analysts in the Strategic Services Bureau examined concentrations of the offenses assault with deadly weapons, carjacking, robberies, and sounds of gun shots in the months prior to the intervention. They also included arrests for crack cocaine and PCP, both possession and distribution. While analysts did not document the choice of bandwidth, method of interpolations, or minimum sample size, it is likely they chose default settings in ArcGIS.

Finally, the MPD Intelligence Unit augmented the concentrations produced by the kernel density techniques by providing street level data on emerging crime problems including violent crime, gun, and drug offenses, which may not necessarily be captured by reported crime data. This latter approach is unique in that many evaluations of crime hot spots only rely on official counts of arrests and calls for service, not tapping into street level intelligence. This is important because approximately ½ of all violent crime goes unreported (Mosher et al., 2011), thus, any analysis that relies on official data, may be missing important geographic patterns.

The five hot spots are located throughout Police Districts 5, 6, and 7 in DC, which are fairly homogeneous when viewed in the context of the whole city. These Police Districts are generally viewed as being home to the most serious crime problems in the city. While area specific data do not exist for these hot spots, it can be extrapolated from the police service area they are located within.

Table 4: Washington DC Police Service Area Demographics

Police Service Area	501	504	602	604	706
Population	21,556	14,829	16,802	16,399	18,829
%AA	81.50%	93.07%	97.72%	98.12%	96.62%
%Hispanic	4.19%	1.32%	0.82%	0.51%	1.00%
%White	14.17%	5.12%	0.79%	0.33%	0.73%
%Under 18	20.57%	24.76%	28.25%	30.98%	35.00%
%Male	48.19%	45.13%	45.71%	43.80%	43.42%
Avg HH Income	\$34,982	\$25,436	\$27,079	\$27,924	\$24,492
%Graduate Degree	9.2	2.25	1.95	2.7	2.08
%College Degree	14.2	8.89	10.7	8.65	7.12
%HS Degree	47.02	50.77	53.41	55.92	56.17
Violent Crime Jan-April '11	82	91	104	72	97
VC rate per 100k	380.4045	613.6624	618.9739	439.0512	515.1628

Source: Neighborhood Info Washington DC

Unit of Analysis

Criminologists have long been concerned with geographic concentrations of crime and the specific characteristics of place which facilitate crime. These were, however, traditionally larger units of analysis such as neighborhoods (see Shaw & McKay, 1942). The current work studies the impact of a geographically focused policing intervention in five smaller locations. MPD has labeled these locations as crime hot spots. However, given the lack of a standard definition of crime hot spots, both in terms of the degree of crime concentration and size (Eck et al., 2005), this label is less informative.

The term hot implies there needs to be some degree of elevated crime and the term spot implies that this elevation is concentrated in a particular location.

Academic criminologists most commonly conceptualize hot spots as micro areas, usually street intersections, which extend no further than line-of-sight (see Sherman and Weisburd, 1995, p.630). However, there is variability in the extant literature. For example, in Philadelphia Jerry Ratcliffe and colleagues at Temple University and the Philadelphia Police Department identified hot spots containing multiple intersections that were not all visible from one single epicenter. Their study of foot patrol in crime hot spots identified 120 locations, which contained an average of 14.7 street intersections and 1.3 miles of streets. And in Indianapolis, police focused on four beats in two areas of the city comprising approximately 4.6 square miles (McGarrell et al., 2001).

The Metropolitan Police Department hot spots would probably be considered large among academics, but not necessarily among police professionals, who anecdotally use the term to refer to larger units such as neighborhoods and police service areas. In Washington DC these hot spots were smaller than neighborhoods, but not necessarily smaller than the traditional conception of a hot spot.

Table 5: 2011 Summer Crime Initiative Hot Spots Size

Hot Spot	Area (sq miles)	Square Feet	Square Meters
501	0.4795	13,370,347.6092	1,242,150.9073
504	0.5248	14,632,363.5582	1,359,396.4945
602	0.1593	4,441,503.3588	412,630.8147
604	0.1956	5,454,141.7807	506,708.3788
706	0.3683	10,269,608.6167	954,081.6764
Total	1.7275	48,167,964.9236	4,474,968.2717
Average	.3455	9,633,592.985	894,993.6543
City	61.4		
% Hot Spots	2.67%		

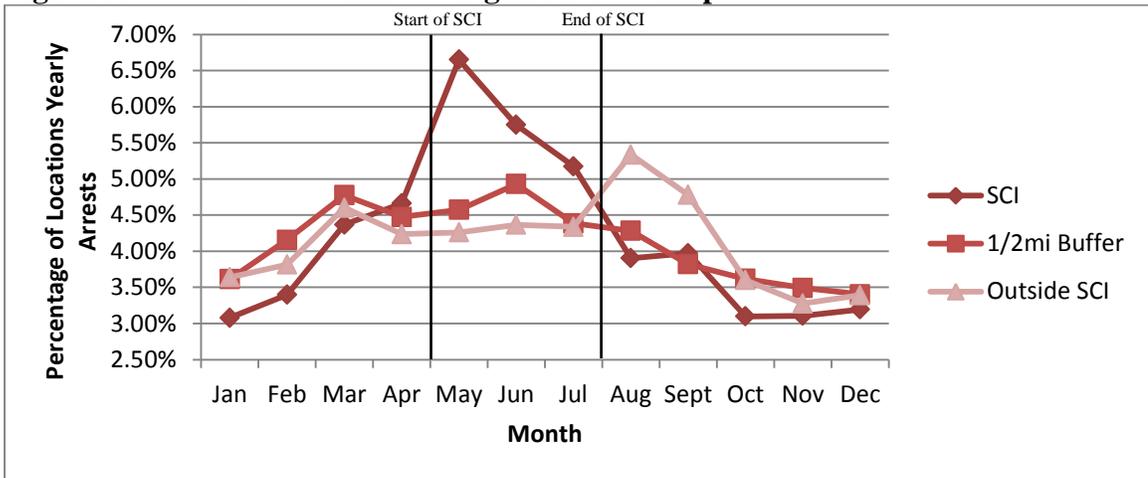
Despite these hot spots being larger than many of the studies in the academic literature, they are still relatively small locations (especially when compared to neighborhood approaches), containing just 2.67% of the cities land. This figure is similar to that used in Lowell, Massachusetts, where the police identified crime hot spots comprising 2.7% of the city's 14.5 square miles.

2011 SCI Dosage

The 2011 Summer Crime Initiative is similar to a number of prominent hot spots policing programs in terms of the length of the initiative as previously discussed in Chapter 2. MPD's hot spots crackdown ran three months between May and July of 2011, the same length as interventions in Philadelphia (Ratcliffe et al., 2011), Jacksonville (Taylor et al., 2011), Indianapolis (McGarrell et al., 2001), and Sacramento (Telep et al., 2012). This three month span was utilized for two reasons: first, MPD noted violent crime spikes specifically during these three months based on an analysis of previous year's data. Second, the department could only reasonably maintain this increased level of patrol saturation for three months without outside funding.

While recent technological advances have enabled researchers to document the location of police more accurately and more cost effectively using automated vehicle locators, this technology has not been widely adopted. This is true in the current work and is further complicated by the observational nature which prevents any systematic social observations to occur as well. However, given the main tactic of the 2011 SCI was patrol saturation, arrests can be used as a proxy in lieu of these measures to capture dosage, since they are highly influenced by police procedures.

Figure 3: MPD 2011 Arrests in Targeted SCI Hot Spots



The 1/2 mile buffer was calculated using ArcGIS 10.0 (Environmental Systems Research Institute, 2011)

A few things become apparent when looking at the number of arrests over a given year by MPD. First, there is a pronounced spike in arrests between April and May of 2011 in the hot spots targeted by the SCI. Indeed, between these two months there was a 42.7% increase in arrests in the hot spots. When comparing the whole three months of the intervention to the three preceding months, the increase is similar at 41.41%. This suggests there was a high degree of patrol saturation in the hot spots when the initiative began in May. The increase in arrests is largely concentrated amongst quality of life and low level traffic violations (see appendix).

Second, and importantly, this dramatic increase in arrests is only noted in the hot spots. When examining crime in a 1/2 mile buffer zone around the target locations, there was a mere 3.6% increase in arrests between the three preceding and intervention months. Similarly, these results are mimicked when examining all areas outside of the hot spots, including the 1/2 buffer. When comparing the three months immediately prior to the

intervention with the three months during the SCI, there was a mere 2.4% increase in arrests.

Finally, the increased arrests of the SCI were limited to the three intervention months. When comparing these months to the three months following the intervention, there was a noted reduction of 37.6%, a level almost equal to the initial increase. Thus, the patrol dosage seems to have returned to normal after the intervention period ended. This is important for assessing post intervention residual deterrence and deterrence decay.

To ensure the treatment was contained within these hot spots, officers were given maps of the locations and stressed to “preserve the integrity” of these locations. The examination of changes in arrests above seems to provide some reassurance that this integrity occurred. Arrests increased by over 40% during the initiative, and in the three months immediately after reduced to nearly pre-treatment levels. However, arrests within a ½ mile buffer zone surrounding these areas noted a small 1.5% increase during the initiative.

How does the dosage of the 2011 SCI compare to other police crackdowns? Based on the arrest information it is reasonable to conclude that there was a sudden and dramatic increase in arrests to a degree greater than at least one prominent police crackdown. When compared to Indianapolis (McGarrell et al., 2011), a study with a similar operationalization of dosage, the dosage in DC was nearly four times greater than in Indianapolis based on arrest data. While population estimates are not available for the SCI areas, it is possible that they are less sparsely populated than the beats targeted in Indianapolis. Thus, additionally controlling for population, the dosage disparity per person could be less in SCI than in Indianapolis. However, the difference in dosage per

square mile may be more relevant theoretically, since it indicates the probability of arrest in a given area for a constant time period. By this measure, SCI had five times the arrest dosage per square mile month as Indianapolis.

Table 6: 2011 Summer Crime Initiative Dosage Comparison

City	Arrests	Arrests per square miles	Arrests per square mile per month
Indianapolis	992	215.652	71.884
Washington DC	1810	1052.33	350.76

The measurement of dosage in studies of police crackdowns seems to be a problem in need of further discussion. Technological advances that allow researchers the ability to track the exact location of police vehicles may be a quick fix to a more complex operationalization. While the location of police cruisers absent any social observations may help pin down the locations of at least the vehicle, they are unable to document what police are actually doing while in the hot spot. While this work is unable to document the activities and behaviors of police during the SCI directly, based on the arrest data it appears the dosage was on par or greater than other prominent police crackdowns. Currently there is limited evidence regarding the fidelity of “treatment” needed to cause crime reductions (see Koper, 1995 for an exception) within crime hot spots.

On the other hand, it can be argued that arrest crackdowns are theoretically different from “presence” crackdowns (Sherman, 1990). Comparisons of dosage across crackdowns must in any case be distinguished based on what was measured. There is neither theory nor evidence to compare the relative effectiveness of increased police presence to increased arrests, with or without increased presence. If future research combines or systematically separates these two kinds of police activity, more progress can be made in answering these questions.

Outcomes of SCI

In their 2012 annual report, MPD claimed the SCI reduced robbery. However, these conclusions are drawn from a non-experimental study which compared robbery from the intervention period (May – July 2011) to the same period one year earlier (May – July 2010). Such a research design is highly susceptible to many threats to internal validity, which is why these types of designs have been referred to as almost “uninterruptable” by Cook and Campbell (1979). Therefore, before the current work examines displacement as a result of the SCI, it will first confirm whether robberies were actually reduced using a more robust quasi-experimental research design. Indeed, crime cannot be *displaced* if it was not first prevented in a primary target place.

Chapter 4: Data and Methods

Data

A variety of data were obtained in order to answer the proposed research questions in the current work. Specifically, there are four sources of data utilized: 1) The Metropolitan Police Department; 2) the Office of Unified Command; 3) the United States Census; and 4) the District of Columbia Office of the Chief Technology Officer. The following chapter describes the process by which these data were obtained, how the data are coded, and how they are analyzed.

Arrests and Offenses

The Metropolitan Police Department provided two data elements for the current work: 1) arrests and 2) offenses. Both elements were obtained for calendar years 2010 and 2011 and serve as the primary dependent and independent variables. Arrest and offense data were obtained through a special Data Sharing Agreement (DSA) made with the department, since the information requested could not be obtained through public repositories MPD currently provides. Data that are publicly available are geocoded to the nearest intersection to protect the privacy of the victim. While this information may be useful for aggregated analyses, it can be problematic when examining specific micro level interventions such as the 2011 SCI. A recent analysis by Andy Brumwell of the West Midlands Police in the United Kingdom compared official crime locations to the “snap location” used by Police.uk, a public repository for police data in England and Wales. His comparison of the “true location” versus the snap location revealed an average offset of 63 meters (Brumwell, 2012). This offset underscores the importance of

obtaining “true locations” for the current analyses given the small geographic areas targeted by the police during the 2011 SCI.

In addition, the current work tracks individual level offending patterns requiring otherwise redacted information to be released. On the condition that no personal information will be revealed in this work and that analyses will be aggregated to secure specific individuals from being identified, MPD agreed to share 2010-2011 arrest and offense data. All data were obtained from MPD’s Research and Analysis Branch, which serves as the evaluation arm of the department. While Washington DC has over 20 law enforcement agencies, MPD formally processes these cases through their intake unit. Thus, all arrests, regardless of jurisdiction, are processed by MPD and captured in their data.

Arrests were classified according to the most serious offense based on DC Code. Variables in the arrest database include: arrest date/time, arrest location, top charge, arrestee name, date of birth, home address, and a criminal complaint number (CCN). The last element, CCN, provides a link back to the original offense which led to the arrest. This is important because it gives the current work the ability to link offenses to arrests. Thus, if an individual targeted by the SCI is arrested anywhere in the city, their offending pattern can be reconstructed. Without this link the current work would be hamstrung given that in many instances the arrest and offense location are different, which would make the analysis of *crime* displacement difficult²⁴. Additionally, it allows the current work to separate police generated offenses from citizen-generated calls for service. As further explained in the Outcome Variables section of this chapter, this separation is

²⁴ Although it may say something about the diffusion of arrests and routine activities more generally.

important in that it allows for a clearer separation between the treatment (Arrests) and outcome (crimes). Below is a summary of the arrest data provided.

Table 7: Citywide DC Code Arrests: 2010 – 2011

Arrest Charge	2010	2011
Aggravated Assault	1,428	1,571
Arson	14	13
Burglary	306	382
Disorderly Conduct/POCA	5,213	4,384
Forgery/Uttering Check	40	17
Fraud	85	167
Gambling	5	15
Homicide/Manslaughter	95	117
Larceny/Theft	1,311	1,428
Liquor Laws	84	47
Narcotic Drug Laws	9,688	9,823
Offenses Against the Family and Children	44	80
Other Felonies	1393	382
Other Misdemeanors	5,212	2,877
Prostitution & Commercialized Vice	1,422	950
Rape/Sexual Abuse	11	131
Release Violations/Fugitive	4,371	6,713
Robbery/Carjacking	901	1,041
Sex Offenses	205	244
Simple Assaults	5,633	5,958
Stolen Property	295	272
Theft from Auto	69	67
Traffic Violations	11,680	11,916
Unauthorized Use of a Vehicle (UUV)	630	654
Vandalize/Tampering w/ Auto	537	681
Vending Violations	484	609
Weapons	999	1,005
Total	52,155	51,54

Similarly, offenses were captured using the most serious crime based on DC Code. All serious offenses are captured in these data with some additional minor offenses including drugs (possession and distribution of controlled substances), prostitution, and weapons related offenses (e.g., carrying a pistol without a license). While DC Code and UCR offense classifications differ to a degree for certain offenses, nearly all Part I

offenses are captured under DC Code in the current works data, as well as several Part II offenses. For full documentation of the definitional nuances please refer to the appendix.

Table 8: Part I Crime: Citywide DC Code Offenses: 2010 – 2011

Offense	2010	2011
Homicide/Manslaughter	132	108
Rape/Sexual Assault	141	174
Robbery ²⁵	4026	4207
Aggravated Assault	2621	2520
Violent Crime	6920	7009
Burglary	4221	3948
Larceny/Theft	9104	10206
Theft from Vehicle	6999	7839
Stolen Auto	4133	3820
Arson	44	39
Property Crime	24501	25852

While Part II offenses are captured by MPD, according to senior level management, the specific offense is not as reliably coded as the offense category (violent, property, drugs, weapons, prostitution, and other). Therefore, Part II offenses are coded using the following offense classification: violent (simple and other assaults), property (forgery and counterfeiting, fraud, embezzlement, stolen property, receiving/possessing stolen property), drugs (possessing or distributing), weapons (carrying a deadly weapon, carrying a pistol without a license, possession of a prohibited weapon (A), possession of a prohibited weapon (B)²⁶), prostitution (including solicitation), and other (vandalism, gambling, offenses against the family and children, liquor laws, drunkenness, disorderly conduct, vagrancy, all other offenses (except traffic), suspicion, curfew and loitering law violations, runaway).

²⁵ While MPD classifies robbery as a violent crime, the current work examines it within the context of instrumental related offenses, since a primary motive behind robbery is to obtain items for monetary gain (see Wright and Decker, 1997).

²⁶Class B weapons generally include knives whereas Class A covers a variety of firearms including machine guns and sawed-off shotguns. See DC § 22-4514 for a full listing of the weapons covered.

Table 9: Part II: Citywide DC Code Offenses: 2010 – 2011

Offense	2010	2011
Violent	1046	1114
Property	8753	9152
Drugs	7415	7072
Weapons	517	565
Prostitution	1295	816
Other	2003	2415

Calls for Service

Calls for service (CFS) data are obtained by the Office of Unified Command (OUC) which manages emergency (911) and non-emergency (311) calls in the District of Columbia. OUC manages approximately 1.8 million emergency calls per year and helps shape policy, maintain technology, and develop standards in the city concerning public and non-public safety communications (2012). Data from OUC were obtained from 2010-2011 and are used to help construct the dependent variable. Since the initiative focused resources in areas with a disproportion amount of violent and gun related offenses, including sounds of gunshots, these data are needed to capture the full spectrum of offenses targeted by the 2011 Summer Crime Initiative.

Table 10: Calls for Service

	2010	2011
Sounds of Gunshots	6286	4819

To be clear, the OUC CFS data also includes the aforementioned offenses in Tables nine and ten, however, the sole source of the sounds of gunshots information is through OUC.

Area Level Demographics

The 2010 United States Census was utilized in order to construct control groups which were similar to the target locations in terms of population, housing, education, and

income. These data were downloaded from the American Fact Finder tool on the US Census Bureau's website (2010). While data were not available at the hot spot unit of analysis, census tracts were aggregated which fall within the target locations since they are the closest unit of analysis containing area level data on a variety of demographics (See hot spot and Census Tract cross walk in the appendix). Data were also obtained from the US Census for the purposes of comparing and contrasting Washington D.C. to some of the other jurisdictions where prominent policing crackdowns have occurred. These comparisons help frame the context of the current study and attempt to provide some sense of how similar and dissimilar the current context compares to other cities prominently featured in the empirical literature.

Place-Based Characteristics

Data on many of the place-based characteristics hypothesized to attract robbers who relocate their offending in the face of the 2011 SCI are derived from the Washington DC Office of the Chief Technology Officer (OCTO), who is responsible for maintaining the city's technology infrastructure as well as providing support to District agencies on technology policy and standards. For several years OCTO has also served as a repository for publicly available spatial data through their Data Catalog (OCTO Data Catalog, 2013). These data include information on the location of every bar, atm/bank, liquor store, or college campus within the District of Columbia. These data are available in several formats, importantly as .shp files, which allow them to be easily imported into ArcGIS for analysis in the current work.

Outcome Variables

While the SCI sought to reduce robbery, crime cannot be used to directly measure the impact of the intervention without modification. Given the arrest-driven approach and its subsequent impact on the volume of these activities in the targeted versus control locations, crime is likely confounded with the outcome of interest—the more police activity the more offenses they are likely going to uncover. Therefore, to parse the impact of the initiative from the treatment, changes in *citizen-generated* calls for service (CFS) are examined among the treatment and control locations. Calls for service data are provided by the Office of Unified Communications and allow for the separation of citizen-generated versus police-generated calls based on response time. By separating police generated calls for service, the current work is able to more directly measure the impact of the SCI on crime versus the impact of the SCI on police activity. Such data are also used to examine both the impact on crime in the areas targeted as well as on local and non-local displacement.

Specifically, the 2012 MPD Annual Report (MPD, 2012) claimed that the 2011 SCI reduced robbery. While these offense types were the primary target of the 2011 SCI, it should also be acknowledged that crime reductions and displacement may not just occur geographically, but also in terms of offense type. For example, as discussed in Chapter 2, many offenders claim to displace their robberies to other instrumental crimes to meet their needs, which often arise out of a “pressing need” for cash (Wright and Decker, 1997). If their attempts to commit robbery are blocked, they claim to switch to other cash-securing offenses. In the current work, these instrumental crimes include robbery, larceny/theft, burglary, motor vehicle theft, theft from a vehicle, forgery and

counterfeiting, fraud, embezzlement, stolen property, and receiving/possessing stolen property

Methods

The current work relies on a quasi-experimental approach to test what affect the 2011 SCI police crackdown had on the volume and placement of crime²⁷. A quasi-experiment shares many properties of experimental approaches except on one key condition: the treatment is not randomly assigned. Therefore, this approach seeks to establish causal inference by establishing a counterfactual through the careful selection of a control group (Shadish et al., 2002). This type of research design improves upon the non-experimental approach taken by MPD in their 2011 Annual Report. Indeed, Cook and Campbell (1979) considered this type of design uninterpretable; therefore, the conclusions drawn from such an approach are untenable. The current work, by measuring crime before, during, and after the intervention in multiple treatment and control sites, rules out many threats to internal validity which plague non-experiments including history, maturation, selection, and regression to the mean, therefore increasing the interpretability of its findings.

Utilizing a contemporaneously measured control group is particularly important in the current context. There are many moving parts to the District of Columbia Criminal Justice System not to mention other important institutions such as school, religion, and the economy, all of which may have an impact on crime in the District (Messner and Rosenfeld, 1994). Given the multitude of agencies within the criminal justice system and beyond that are simultaneously operating during the 2011 SCI, it is important to control

²⁷ This is the equivalent of a level 4 on the Maryland Scientific Methods Scale (Sherman et al., 2002).

for these macro level effects to help isolate the impact of the SCI from all other influences. Period effects of the summer also underscore the need for a control group. It is common knowledge that certain offense types increase during the summer due to changes in individuals routine activities. Thus, any intervention conducted during the summer is at a disadvantage if simple pre-test / post-test measures are used. Also problematic, but for different reasons, is the gradual decline in crime throughout the city since the mid-to-late 1990s. Given that crime has been declining when measured city-wide it is likely that any pre/post-test measure with no control group is likely to find reductions regardless of whether the policy or program under study actually works.

Finally, DC is undergoing a period of large scale economic development and gentrification. The 2010 Census was the first in over a half a century which indicated a population increase. This influx of new residents is pushing out many older citizens in certain communities, driving up real estate prices, and changing the makeup of communities. As previously noted, the Office of the Deputy Mayor for Planning and Economic Development estimates there is currently more than 60 billion dollars in commercial, residential, and institutional projects that have been constructed, planned, or proposed in the District of Columbia (2012). While the impact gentrification has on crime is open for debate (see Matsuda, 2009), it at least underscores that the city is not a static organism. This constant change and evolution has potentially confounding effects on any single group research designs.

Selection of Control Sites

While it is not possible to simultaneously expose the SCI hot spots to both control and treatment conditions, causal validity can be established with the thoughtful selection

of a counterfactual. Ideally, this is done through the random assignment of treatment and control among a sample of eligible locations. However, given the observational nature of the current work this approach is not possible. Therefore, the selection of control sites must be based on factors that are observable. Three are utilized in the current work:

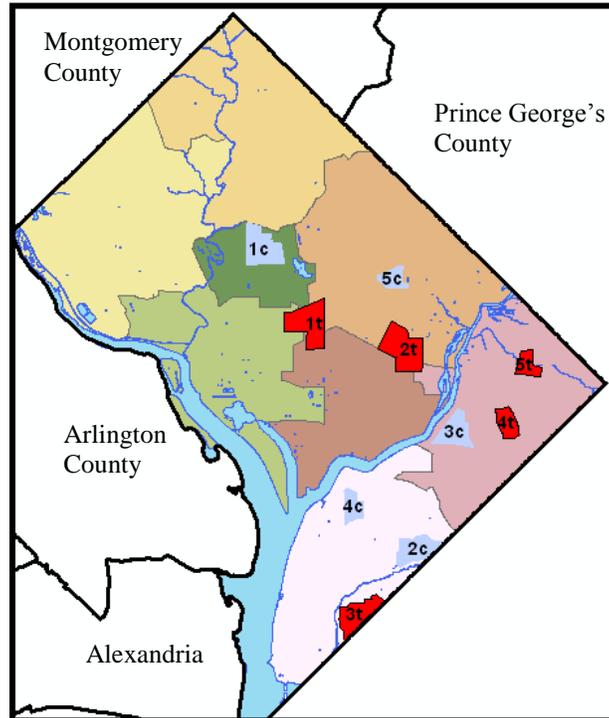
1. Crime
2. Demographics (population, housing, employment, and income)
3. Dosage (Arrests)

The first step in selecting appropriate controls retraces the procedures used by MPD to identify the five SCI areas. These five hot spots are paired with five similarly sized locations based on concentrations of offenses used by MPD in the original selection of the treatment locations: assault with deadly weapons, carjacking, robbery, sounds of gun shots, and crack cocaine and PCP arrests (both possession and distribution). Additionally, the same Kernel Density Estimation (KDE) procedure utilized by MPD is also implemented in selecting the control locations (see Chapter 3). However, exact parameterization of the procedure was not documented by MPD. Thus, the current work, while relying on KDE techniques, must choose a method of interpolation, choice of bandwidth, and minimum number of points independently (Levine, 2010). The current work found useful results using a normal method of interpolation, fixed interval bandwidth, and an interval width of 50 meters. These parameters provided results precise enough to parse out various clusters of crime, without too much aggregation. The KDE provided useful guidance in selecting control locations, but the final outlines of the locations will not exactly match cells with the highest density. Because these density grid

cell boundaries are arbitrary, control location edges are drawn based on the natural physical boundaries such as a river or highway—procedures used by MPD as well.

Second, the areas context, as measured by the age, race, gender, housing, and economic factors are examined. Areas that are located within the same police district are given priority when selecting controls. These areas are more likely to provide similar contextual matches and also help ensure the police response more generally was uniform in the pre-test and post-test periods since these areas were policed by the same Commander. Additionally, sites that were too close (within 1-10 city blocks) were excluded since there may be treatment contamination issues. After implementing the KDE procedure with these criteria, five potential controls were identified.

Figure 4: Washington DC 2011 SCI Target (1-5t) and Controls (1-5c) with 1000 Foot Buffer



As noted above, six of the 10 hot spots are located in Wards 7 and 8, with the remaining four scattered amongst Wards 1, 2, 5, and 6.

Equivalence of Control and Target Hot Spots

Baseline measures of all observable characteristics between the control and target hot spots are examined to ensure the groups are similar prior to the SCI. To examine the equivalency of target and control hot spots a series of t-tests are conducted. First, offenses are broken down by monthly averages per each of the 10 hot spots (5 SCI locations and 5 controls) over the 16 prior months for a total sample of 160.

Table 11: 16 Month Hot Spot Offense Averages (n=160)

Offense	Targeted (SD)	Control (SD)	P-value
Part I			
Homicide/Manslaughter	0.3250 (.2422)	0.2650 (.6231)	0.4244
Rape/Sexual Assault	0	0	--
Robbery	9.775 (8.5402)	10.2 (9.0251)	0.7601
Aggravated Assault	4.8250 (3.4212)	4.3250 (4.1313)	0.4057
Burglary	6.0250 (7.2328)	6.1750 (7.5342)	0.8448
Larceny/Theft	7.0277 (7.2429)	8.4177 (15.3242)	0.4642
Stolen Auto	5.4875 (4.9278)	5.0375 (5.2374)	0.5765
Arson	0	0	--
Part II			
Violent	9.2155 (7.2342)	8.9250 (8.6322)	0.8178
Property	75.7091 (43.8346)	73.4693 (38.6599)	0.7322
Drug	9.475 (7.9855)	5.9 (3.5926)	0.0004
Weapons	1.0125 (1.3923)	0.8750 (.7234)	0.4343
Prostitution	1.1250 (1.6272)	1.2750 (1.7261)	0.5725
Other	19.2342 (15.7939)	17.2342 (12.9864)	0.3830
OUC			
Sounds of Gun Shot	3.0120 (.9682)	2.8970 (.4972)	0.3461

Of the crimes examined only drug related offenses showed a statistically significant difference, with fewer crimes counted in the controls than in the SCI areas. However, it is important to note that drug offenses were not specifically targeted by the SCI and therefore did not play a role in the selection of either the intervention or control locations; indeed, drug offenses per se are almost entirely a reflection of proactive policing, rather than a reflection of offense reported by victims or the public. While

arrests for crack cocaine and PCP were also used to select sites, these are a very small percentage of the total offenses used to identify the treatment and control locations. And when broken down by drug type, there are no statistically significant differences between the treatment and control areas in crack cocaine and PCP arrests at baseline (p-value = .1465).

Second, demographics are examined. The greatest challenge in identifying matching control locations to those selected by MPD for the SCI lies in developing area level measures from US Census Data, whose boundaries do not align with each hot spot. As noted previously, the hot spots targeted by MPD do not align perfectly with Census Tract boundaries, thus, it is difficult to extract data directly from the source without thoughtful aggregation. The current work utilizes Census data to gain target and control hot spot level measures through an un-weighted and weighted average approach. Given the alignment issues, Census Tract data are also weighted based upon the proportion of each hot spot they occupy. For example, if hot spot A has four census tracts (1-4) located within its boundaries, and tract 4 occupies 75% of the hot spot, demographic, economic well being, and other data are weighted in proportion to the area the tract occupies within the hot spot. While still prone to aggregation bias, given the authors working knowledge of each hot spot and control, these approaches seem to provide a reasonable method for parsing and aggregating Census Tract data to each hot spot and control.

When examining the un-weighted average of all the Census Tracts in the target (23) versus control hot spots (18), only the percentage of the population which is Hispanic is significantly (marginally at p-value .08) different between the two groups.

Table 12: Un-Weighted Demographic Averages (Target n=23; Control n=18)

Variable	Target (SD)	Control (SD)	P-value
Avg Square Miles	0.3456 (0.1584)	0.3144 (0.1116)	0.6557
% Pop: 15-24	8.8043 (2.3007)	11.1944 (7.9602)	0.1776
% Pop: 25-29	9.6304 (4.6304)	11.4555 (5.0267)	0.2349
Median Age	32.926 (4.4427)	31.2722 (4.2387)	0.2348
% Pop: 18+	77.2304 (7.6595)	77.4 (8.1965)	0.946
% Pop: 62+	11.987 (3.8136)	10.3666 (3.5682)	0.1729
% Male Pop	46.0348 (3.5511)	46.7777 (4.0999)	0.538
% Male Pop: 15-19	4.0565 (2.5156)	3.5388 (1.2645)	0.4307
% Male Pop: 20-24	3.9 (1.0005)	4.9055 (3.0028)	0.1398
% Male Pop: 25-29	4.3608 (2.5743)	5.48333 (2.9776)	0.2034
% White	12.4478 (15.57)	16.2666 (18.0551)	0.4717
% Black or AA	80.8565 (20.9173)	71.4888 (29.526)	0.2416
% Hispanic	8.3217 (3.8458)	11.4055 (15.1548)	0.085
% Occupied Housing	87.6826 (4.7944)	88.8222 (3.5481)	0.4043
% Vacant Housing	12.3174 (4.7944)	11.1777 (3.5481)	0.4043
Rental Vacancy Rate (%)	8.6391 (3.822)	7.8444 (2.7558)	0.4619
% Own Occupied Housing Units	33.7826 (14.3701)	28.7888 (10.8394)	0.2277
% Rent Occupied Housing Units	66.2174 (14.3701)	71.2111 (10.8394)	0.2277
% 16+ Unemployed	17.613 (8.5743)	14.7888 (6.8676)	0.2614
% Persons w/o HS Diploma	21.7478 (7.8976)	25.4444 (8.2834)	0.1534
Poverty Rate (05-09)	30.0435 (11.035)	26.2277 (9.284)	0.2466
Median Household Income	39251 (19801)	40705 (11541)	0.7836

However, weighing each Tract by the proportion of the target or control hot spot reduces the differences in most cases and eliminates the previously found statistically significant differences.

Table 13: Weighted Demographic Averages (Target n=23; Control n=18)

Variable	Target (SD)	Control (SD)	P-value
Avg Square Miles	0.3456 (0.1584)	0.3144 (0.1116)	0.6557
% Pop: 15-24	8.5675 (1.5848)	8.9248 (2.2391)	0.5532
% Pop: 25-29	9.0886 (3.9621)	10.0488 (4.8063)	0.4863
Median Age	33.5841 (3.8518)	31.8084 (3.8982)	0.1531
% Pop: 18+	76.0726 (7.0161)	75.071 (7.1308)	0.6549
% Pop: 62+	12.592 (3.488)	11.0475 (3.4248)	0.2834
% Male Pop	46.1645 (3.4315)	45.85503 (4.02)	0.7918
% Male Pop: 15-19	3.7772 (1.3732)	3.8234 (1.1186)	0.9085
% Male Pop: 20-24	3.8488 (1.0234)	4.196 (1.6424)	0.4116
% Male Pop: 25-29	4.1338 (2.3148)	4.645 (2.8755)	0.5317
% White	9.91 (7.91)	9.8515 (11.8511)	0.9846
% Black or AA	80.4683 (17.2043)	78.2029 (24.5393)	0.7302
% Hispanic	9.5335 (2.6524)	11.9155 (12.9701)	0.3945
% Occupied Housing	87.6147 (4.2887)	89.5838 (2.8661)	0.102
% Vacant Housing	12.3852 (33.6679)	10.4161 (22.2524)	0.8317
Rental Vacancy Rate (%)	9.0024 (4.7451)	7.6466 (2.2825)	0.2493
% Own Occupied Housing Units	33.7438 (14.1466)	28.7329 (10.4643)	0.2165
% Rent Occupied Housing Units	66.2561 (14.6951)	71.267 (10.1664)	0.2251
% 16+ Unemployed	18.445 (8.1966)	16.1207 (6.1659)	0.3339
% Persons w/o HS Diploma	23.1753 (6.9463)	25.0662 (7.1961)	0.3997
Poverty Rate (05-09)	30.1698 (11.1463)	27.8218 (8.8463)	0.4692
Median Household Income	38618 (14463)	38834 (10713)	0.9585

Given these baseline similarities, any post intervention differences in crimes noted can be more confidently attributed to the intervention as opposed to pre-treatment demographic differences. While not all characteristics of these areas can be observed, and the attribution of Census data gathered at one unit of analysis on the intervention and control locations may be imprecise, it provides a basic check of the counterfactual logic.

Finally, dosage is examined. It is important to document the lack of crackdown in the control locations to ensure there is no contamination of treatment. When comparing the two types of locations (target versus control), it becomes clear that the dramatic increase in arrests noted during the SCI in the targeted locations does not occur in the control. Whereas the targeted locations noted over a 40% increase in arrests during the

SCI, control locations actually experienced a decrease of 5%. This decline is interesting in that not only does it indicate that the controls selected received no increased police presence or contamination from the SCI areas, but that they also seemed to receive *less* attention given the general increase in arrests city-wide over this period. When examining all arrests in the city outside of the SCI targeted locations, an increase of 6% is noted. After the SCI initiative ended, arrests were back up in the control locations to pre-treatment levels. Again, perhaps this indicates that as resources were shifted to the SCI areas, resources may have been pulled from other hot spots.

Table 14: Target v. Control Hot Spot Dosage

	Within		.5 mile buffer		Outside	
	Target	Control	Target	Control	Target	Control
Frequency of Arrests Three months before SCI	1280	944	3225	3225	11822	11822
Frequency of Arrests Three months during SCI	1810	892	3341	3341	12109	12109
Frequency of Arrests Three months after SCI	1130	940	2819	2819	12814	12814
Before → During Percentage Change in Arrests	41.41%	-5.51%	3.6 %	1.52%	2.43 %	6.65%
During → After Percentage Change in Arrests	-37.569	5.38%	-5.6241	-3.33%	5.822116	.1%

The differences in arrest dosage are fairly dramatic when examined graphically. Whether examining the percentage of arrests by each target or control hot spot over 2011, or by frequency, a salient spike is noticeable in the target, but not in the control. Conversely the

control exhibits a rather stable dosage over the course of 2011. Additionally, while the SCI locations evidence a spike, it diminishes over the course of the intervention and may indicate a loss in treatment fidelity.

Table 15: Percentage of 2011 Arrests by SCI Target Versus Control Hot Spot

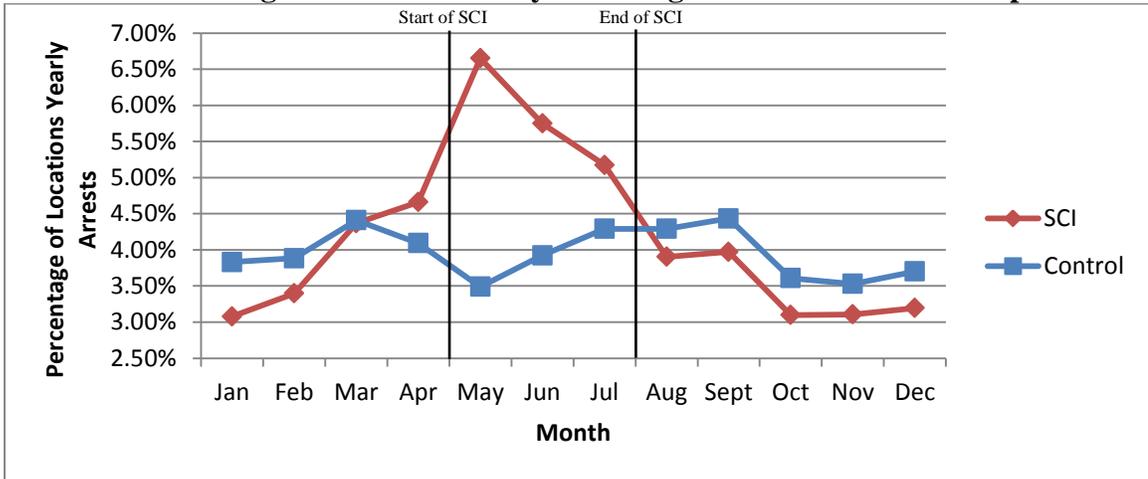
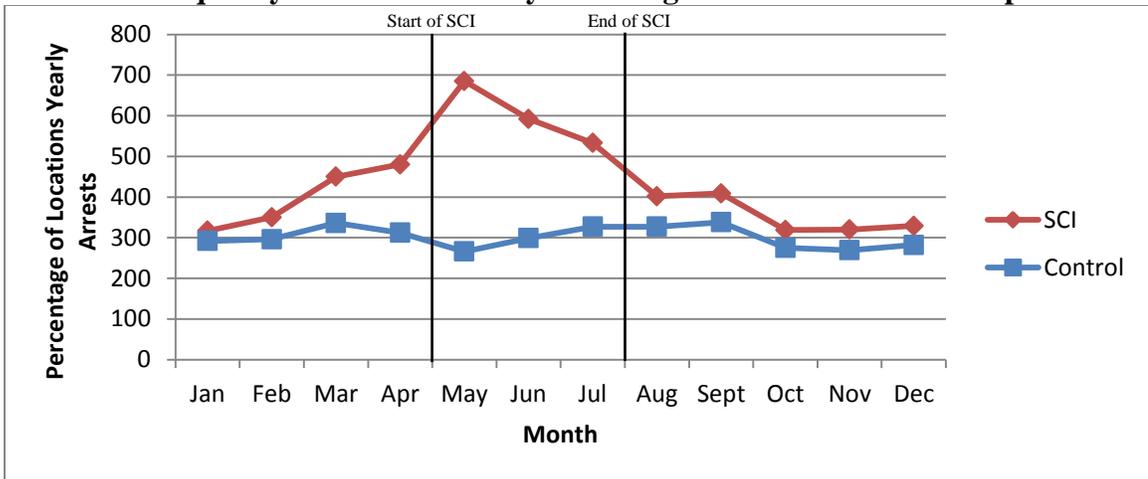


Table 16: Frequency of 2011 Arrests by SCI Target Versus Control Hot Spot



While there were fewer arrests in the control locations at any point in time compared to the SCI areas, the differences are only statistically significant when comparing the three month period of the SCI using location months (3 months over 10 treatment and control locations).

Table 17: Arrest Dosage by Location (n = 30)

	Target (SD)	Control (SD)	P-value
3 month prior average	85.8 (62.42)	62.93 (30.35)	0.2124
3 month during average	116.4 (83.31)	59.46 (34.54)	0.0210
3 month post average	74 (60.16)	62.66 (32.09)	0.5250

Analytic Approach to Examine Whether the Intervention Reduced Robbery

As stated previously, the current work relies on a pre-test post-test in multiple treatment and comparison groups, which were matched based on crime, demographic features of place, and arrests. Equivalence between the treated and control hot spots has been documented above, therefore, to discern whether the SCI had an impact on citizen-generated robbery calls for service, changes in the mean level of these calls during and after the treatment are analyzed. To do so the current work examines the differences in the means during and after the intervention through t-tests, and the difference in differences (see Bushway, 1998; Card and Krueger, 1994; Cook and MacDonald, 2011; Grogger and Willis, 2000; Telep et al., 2012). There are two steps to this approach. First, the difference in citizen-generated calls for service before and during the SCI in the locations targeted by MPD is calculated. Second, the same difference is calculated for the control locations, and the difference between these two differences is computed to arrive at the difference in differences.

This approach is advantageous in the current work for a number of reasons, helping to account for omitted variable bias that would plague the results of any non-experimental approach. First, simply examining the experimental locations pre/post difference (step 1 from above) ignores the gradual and steady crime reduction occurring on a city wide basis in Washington D.C. Given this dynamic almost any area of the city could be selected randomly, and if a long enough timeframe is examined, reductions can

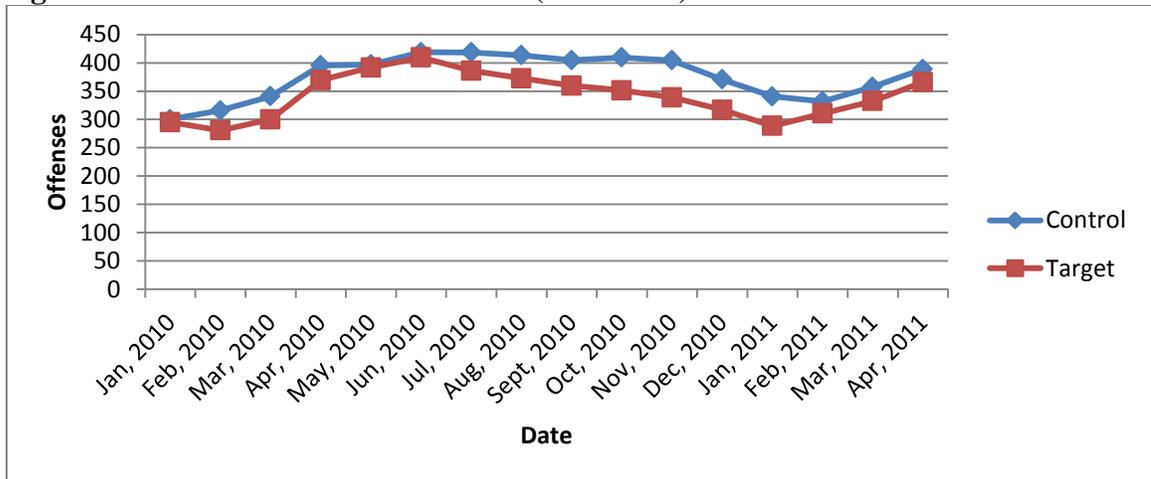
likely be found. Difference in difference estimations are not as vulnerable to this problem since the method requires contemporaneous control sites to be selected that should experience the same city-wide drop. Similarly, difference in differences estimates are better situated to control for natural summer increases in crime that may also occur for similar reasons. Second, since the control groups were selected in a way as to make them equivalent on all observable characteristics pre-treatment, any reductions in crime can more confidently be attributed to the SCI versus baseline differences. Regardless, the method has the ability to be incorporated into a regression framework that can control for both static and time-varying covariates which may interact with the treatment. Given the short time window of the current work, and static nature of the factors used to match treatment and control locations, no time-varying covariates are included.

The method has a primary assumption, which is that parallelism exists between the two groups. Meaning, the trend in treatment would have been the same as the control in the absence of any intervention. This is an important advantage to the method over simply comparing the differences between treatment and control post SCI using a t-test. Such an approach assumes, without testing, that the pre-test results exhibit the same trend. While matching helps account for this, it does not attempt to model the pre-test data overtime, and instead aggregates this information into a single average. While this may be useful, there are clearly instances where two entirely different trends could produce the same exact pre-test average. For example, take two series of data, one ascending over 12 months from 1 robbery per month to 12, the other descending from 12 robberies per month to 1. Both series have the same 12 month average of 6, but these two

series of data are clearly not “equivalent”. Thus, the approach taken in the current work takes a more nuanced approach to ensuring pre-test equivalence.

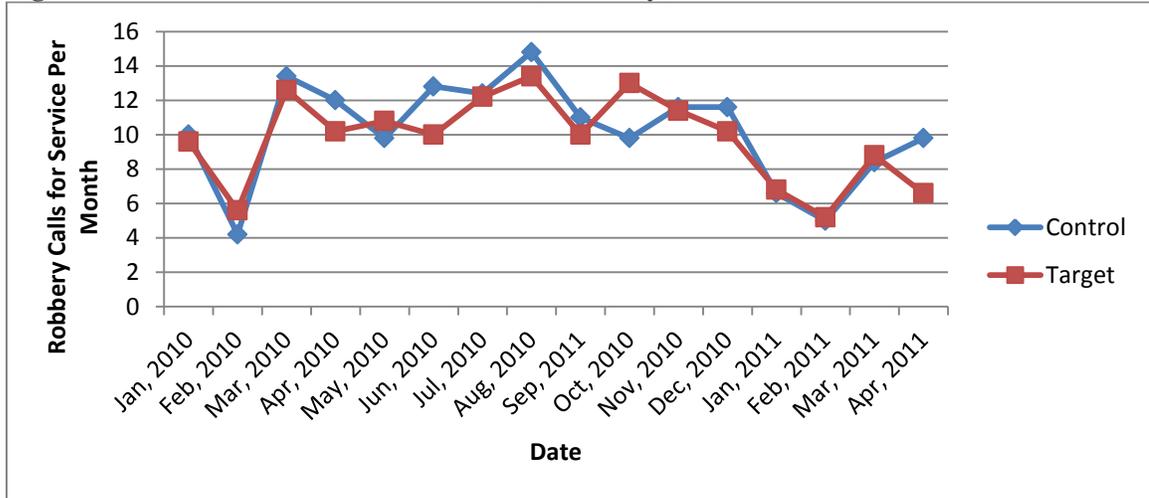
While not always tenable, nor directly observable, the current work is able to document a high degree of covariation in offenses between these two locations prior to the intervention, which strengthens the case that the groups trended together prior to the intervention. In the 16 months prior to the SCI, treatment and control sites experienced a correlation coefficient of .801 that is statistically significant as the .01 level. When broken down by offense type, positive and statistically significant correlations (at .01) are also noted for violent ($r=.77$) and property ($r=.81$) crimes. Because of this high degree of covariation any sudden and dramatic divergence in crime between these two seemingly parallel trends can more confidently be attributed to the SCI.

Figure 5: Pre-Intervention Parallelism (All Crime)



When looking at robbery specifically, the results are similar, with high correlations existing between treatment and control sites in the 16 months before the intervention ($r=.7293$). This high degree of parallelism suggests that examining the difference in differences would be appropriate in the current study.

Figure 6: Pre-Intervention Parallelism (Robbery)



Difference in differences are estimated using Stata 12.0 (StataCorp, 2011) with the user written command “diff” (Villa, 2013).

Analytic Approach to Examine Changes in the Placement of Crime

The current work documents the SCI’s impact on the placement of crime by tracking changes in both general and specific displacement. General displacement is defined as any behavior by any offender that is redirected from the target and control sites into nearby buffer zones. Whereas specific displacement tracks an explicit group of offenders to document how the SCI impacts their behavior, regardless of where that behavior occurs in D.C.

General Displacement (Buffer Zones)

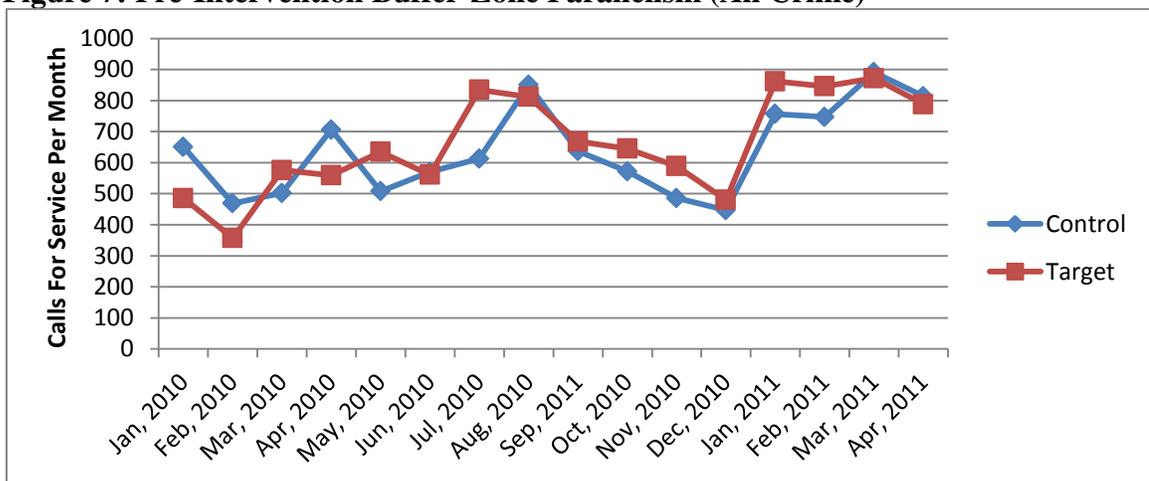
General displacement—the displacement of crime by anyone—will be measured using techniques commonly employed in the literature of police crackdowns. Two block buffer zones are created around each target and each control location. Equivalence in the number of offenses in these locations prior to the intervention is documented below.

Table 18: 16 Month Target and Control Hot Spot Buffer Zone (1000 feet) Offense Equivalence (n = 160)

Offense	Target (SD)	Control (SD)	P-value
Aggravated Assault	11.1375 (17.7753)	13.85 (23.8844)	0.4164
Burglary	18.4 (43.9348)	23.1 (44.7601)	0.5073
Homicide	0.125 (3.4034)	0.0875 (0.8944)	0.9242
Prostitution	1.4875 (13.5792)	2.3625 (8.3842)	0.6245
Robbery	8.4875 (4.5147)	9.8875 (7.6066)	0.1589
Shootings	8.125 (3.8917)	9.775 (2.5252)	0.0018
Simple Assault	22.075 (34.4621)	22.7375 (28.1110)	0.8942
Theft	33.7625 (52.4656)	33.1375 (53.9317)	0.9409
Weapons	0.0125 (1.0523)	0.0875 (1.5275)	0.7178

As documented, there are largely no differences in prior offense rates per location per month during the 16 months before the 2011 SCI. The one exception being the number of reported shootings and sounds of gun shots. To determine whether the SCI led to general crime displacement, an examination of the difference in difference between these locations, as discussed previously, is employed. There is a high degree of parallelism among crime between these two locations. Indeed, offenses are highly correlated ($r=.7611$) when also looking robbery CFS ($r=.5055$) and instrumental CFS ($r=.5406$) (see Appendix for these tables).

Figure 7: Pre-Intervention Buffer-Zone Parallelism (All Crime)



Crime Displacement (Individual Level)

The idea of specific displacement is linked to the individuals who committed robbery in the target areas before the crackdown. A cohort of these offenders is selected and tracked before, during, and after the three month SCI to determine the degree to which their stream of offending changed as a result of the SCI. In the 16 months prior to the SCI there were a total of 475 unique individuals who were arrested for a robbery, 244 within one of the five control hot spots, and 231 within one of the five targeted hot spots. There were no offenders who overlapped between targeted and control hot spots during this selection period. As documented below, these individuals are equivalent on a number of factors tabulated from 1995 through April 2011 that are likely related to their displaceability, including their level of offending in the past, age, average journey-to-crime, and prior number of home addresses.

Table 19: Equivalence of Robbers Pre-Intervention (n = 475: 244 control, 231 experimental): 1995 – April 2011²⁸

	Target (SD)	Control (SD)	P-value
Age	33.67 (13.27)	32.41 (13.98)	.3148
% AA	92.64	91.39	.6171
Prior Arrests	14.12 (20.4)	13.78 (18.16)	.8478
Prior Robbery Arrests	1.2019 (0.6412)	1.1861 (0.6144)	.7840
Prior Violent Crime Arrests	2.02 (4.07)	1.97 (4.54)	.8997
Prior # of home residences	3.4825 (2.9196)	3.6125 (2.6965)	.6142
Avg distance to crime (meters)	2461.3442 (3440.4982)	2615.6512 (3142.6549)	.6097
Age at first arrest	26.9 (10.147)	28.15 (9.0154)	.1560
% of offenses in SCI areas	30.303	2.459	.0000
% of prior offenses in control areas	1.7316	35.6557	.0000

The only statistically significant differences between the two groups arises when looking at the locations they were criminally active in the past. As expected, active robbers in the targeted hot spots had a greater share of their *total* offending in these

²⁸ See the Appendix for hot spot specific values.

locations compared to robbers active in the control group hot spots (30.303% versus 2.459%). Similarly, active robbers in the controls had a greater share of their total offending in control locations compared to targeted hot spot robbers (35.5667% versus 1.7316%).

To determine whether active robbers targeted by the SCI were more likely to reoffend and relocate their crime, a series of z-tests for proportions are examined based on rearrest data (Bachman and Paternoster, 2009). In the current work, arrests are used as a proxy for reoffending since no self-report data are available. The proportion of targeted active robbers who were rearrested during and after the 2011 SCI is compared to this same proportion for active robbers from the controls. The location of these offenses (based on the arrest data²⁹) patterns is also examined within the context of the locations laid out in the hypotheses from Chapter 2. In addition to this proportional analysis, changes in the distance of displacement between active robbers and controls offense location is also constructed. The distance between active robbers' last offense before the SCI and first offense during and after the SCI is compared to the same such distance for active controls.

It is important to make a distinction between examining changes between offense locations and changes in individual robbers' journey-to-crime. The current work argues that examining changes in the offense location is a better measure of crime relocation than changes in journey-to-crime. Journey-to-crime, while a similar measure, examines changes in an offenders travel distance from their home to the location of their crime, with the theory being that if robbers active in the areas targeted by the SCI increase their

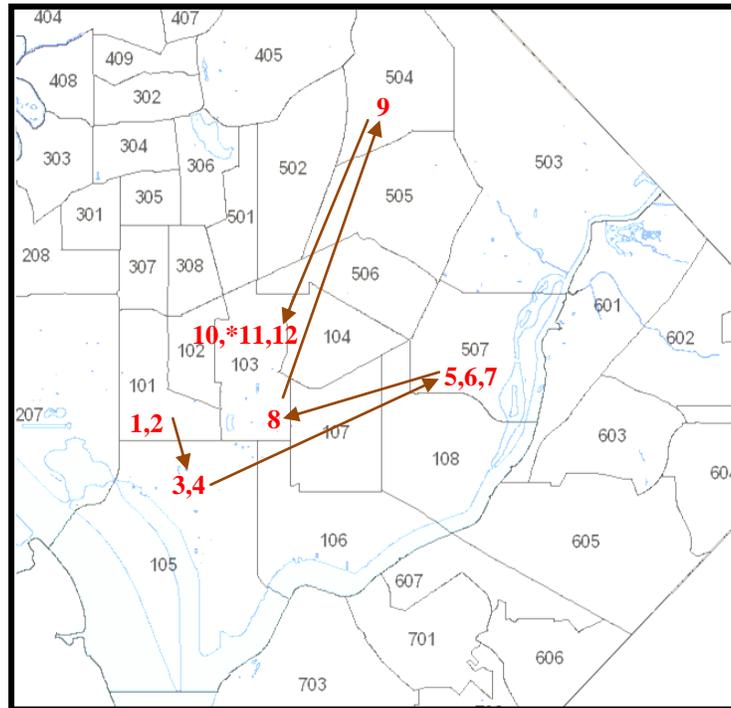
²⁹ The arrest data are only used to link targeted and control robbers to crimes in order to obtain its date, time, type, and location. Importantly, the timing and location of crimes in the current work are based on the offense attributes.

journey-to-crime distance relative to controls, it may be evidence of crime relocation. This analysis wholly hinges upon being able to accurately identify a person's starting point (home address). However, these data and moreover the notion of having a "home" for the population under study, may be an unrealistic concept. It is an axiom among law enforcement professionals that many offenders are highly transient and often live on the streets or perpetually couch surf between relatives, girlfriends, and shelters. Therefore, when the police collect home address data, it may not be a reliable indicator of the journey the arrestee took to get to their crime.

Even if these data were accurate, it is hard to determine whether simply looking at changes in the journey-to-crime alone would offer insights into crime relocation, the main question being tested in the current work. For example, if a person moves three miles away, and starts committing crimes in *new* areas, but does so by traveling the same distance from their "home" when they were active in the hot spots, it would appear that their crimes were not being displaced since there was no change in their average journey to crime. This is obviously problematic, thus, the current work relies on examining changes in the probability of relocation compared to controls, and changes in the distance between offense locations before, during, and after the SCI.

Finally, to further examine whether the SCI caused previously active robbers to relocate their behavior, changes in their *stream* of offending are examined. To illustrate how these analyses portend to detect spatial displacement, two offenders are chosen at random (1 targeted, 1 control) and their offense location progression is displayed, beginning with their first offense location (documented because of an arrest) through each subsequent offense denoted in chronological order:

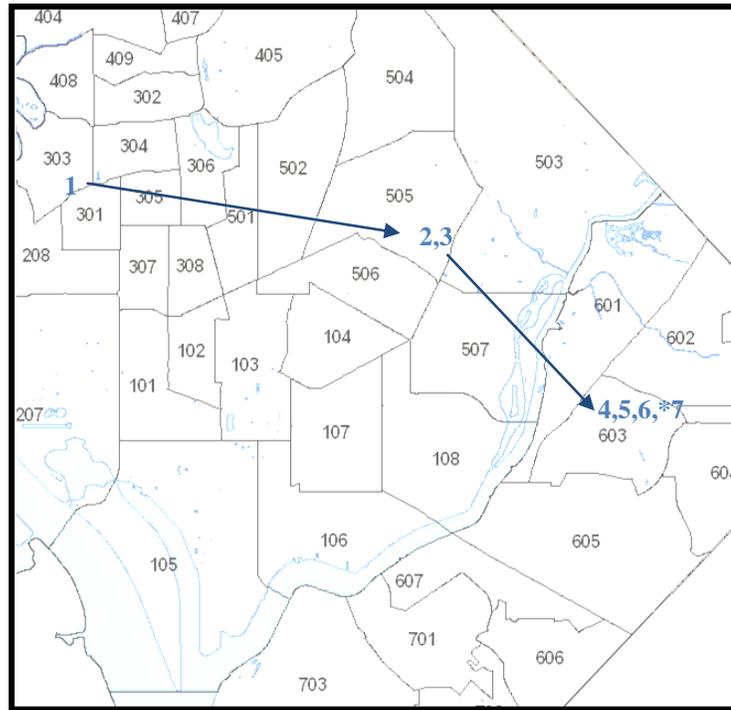
Figure 8: Targeted Robber Offense Location Stream (Index Offenses)



*Indicates robbery location that made the offender eligible for the current analysis. Robbery locations are aggregated to the Police Service Area for this demonstration.

In the first example, the targeted offender committed 25% (3 of 12) of offenses for which they were arrested in one specific SCI hot spot. Thus, they can be said to be loosely tied to this location in the sense that most of their offenses that were cleared through arrest occurred outside this specific targeted location.

Figure 9: Control Robber Offense Location Stream (Index Offenses)



*Indicates robbery location that made the offender eligible for the current analysis. Robbery locations are aggregated to the Police Service Area for this demonstration.

This control offender committed 57% (4 of 7) of their offenses they were arrested for in a specific control area, indicating a stronger tie than the previous example.

The current work builds on these individual level offense patterns by calculating averages for all targeted and control robbers and tracking changes in these streams during and after the SCI to identify spatial displacement. For example, if 30% of active robbers were getting arrested for crimes committed before the SCI in one specific hot spot targeted by MPD³⁰, displacement would cause an interruption to this stream of offending such that a greater share of their prior activity should be noted during and after the SCI in areas not targeted. Thus, if during the SCI 5% of the offenses targeted robbers were

³⁰ Note, this is based on the single control or targeted hot spot which led the robber to be included in the analysis. For example, if offender 1 was arrested for a robbery committed in control location 2 in the 16 months prior, this hot spot would be used to determine how “tied” they were to said location. However, offender 2 may have been arrested for a robbery committed in control location 4, which would thus be used to calculate their level of attachment. The same convention is used for the offenders active in targeted hot spots.

arrested for occurred inside the same targeted SCI hot spot (a decrease of 25 percentage-points from baseline) it may be suggestive of spatial displacement, particularly if the active controls do not exhibit a similar locational disruption despite similar rearrest rates.

Additionally, the analyses will also examine distinctions between locations that were a part of the offense stream from completely new locations. If offenders from the SCI areas are getting rearrested at greater rates than individuals from the controls, and the locations they are committing these crimes outside the SCI areas is greater than their prior offending stream, in particular, to completely new locations, it can be cautiously concluded that displacement may have occurred, particularly if these noted changes are not documented amongst the control cohort.

Finally, changes in the intermittency of rearrests are examined. Comparisons are made between the pre crackdown frequency of arrests to changes during and after between the targets and controls. Increases in the lengths between arrests among targets could be suggestive of deterrence. These data, combined with the aforementioned relocation analyses, will help to discern changes in the stream of offending caused by the SCI.

Chapter 5: The Impact of the Summer Crime Initiative on the Volume and Placement of Robbery

Between May and July of 2011 the Metropolitan Police Department undertook an arrest-driven police crackdown in five crime hot spots. This initiative was labeled a success by the Department in their 2012 Annual Report (MPD, 2012). Specifically, when MPD compared the rates of robbery during the three month initiative to the same three months the previous year, reductions were noted. However, as stated previously in Chapter 3, this research design, which examines a pre-test post-test with no control group, has been called uninterpretable by esteemed research methodologists Cook and Campbell (1979) because of myriad threats to its internal validity. Thus, the claims made by MPD are likely untenable without addressing these threats. To examine the impact of the 2011 SCI with a higher degree of internal validity, the current work uses a pre-test post-test with multiple treatment and control groups (Shadish et al., 2002). This type of design removes many of the threats to internal validity which limit the strength of conclusions drawn within MPD's 2012 Annual Report.

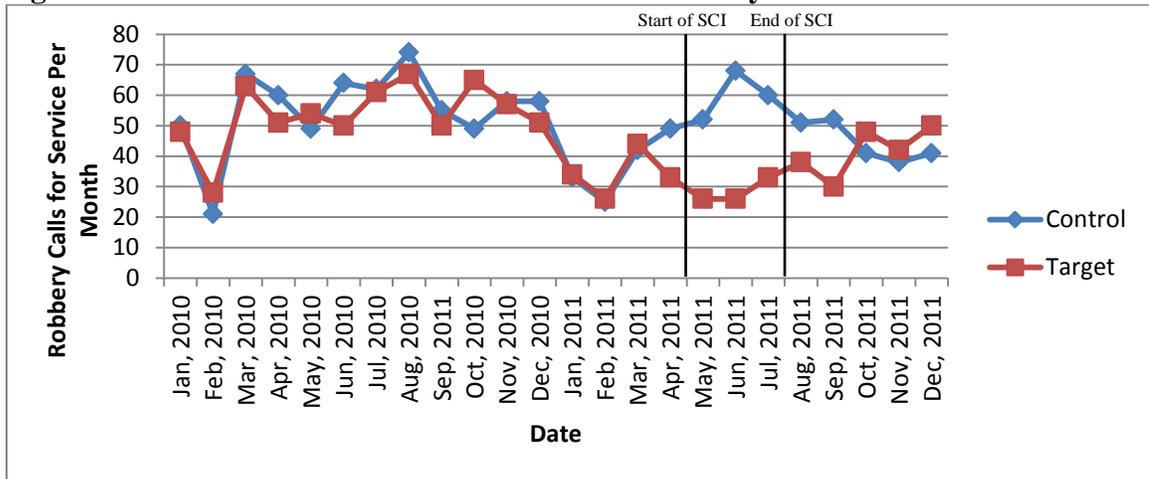
While the SCI sought to reduce robbery, crime counts alone cannot necessarily be used to directly measure the impact of the intervention. Since the main tactic was proactive police patrols, it is likely confounded with the outcome of interest—the more police activity the more offenses they are likely going to uncover. Therefore, to parse the impact of the initiative from the treatment, changes in *citizen-generated* calls for service (CFS)³¹ are examined among the treatment and control locations in each of the below analyses.

³¹ Calls for service data provided by the Office of Unified Communications allowed for the separation of citizen-generated versus police-generated calls based on response time. By separating police-generated calls for service, the current work is able to more directly measure the impact of the SCI on crime versus

The Impact of the 2011 SCI on Citizen-Generated Robbery CFS

There were a total of 2,244 citizen-generated robbery CFS in the targeted and control hot spot locations during 2010 and 2011. In the 16 months before the intervention, between January 2010 and April 2011, control locations experienced 816 robbery CFS compared to 782 in the targeted hot spots. When viewing these patterns over the course of 16 months, robberies in the control and target hot spots track each other relatively closely leading up to the intervention in May of 2011, with a correlation of .7293. Robberies are generally lower in these locations in the beginning of the year, rise slowly and peak during the summer, and then gradually decline as summer turns to fall and winter³².

Figure 10: Total Number of Citizen-Generated Robbery Calls for Service



However, while the control and hot spots track closely throughout this 16 month period, they diverge once the 2011 SCI begins, when robberies are consistently lower in the targeted hot spots. During the intervention, 95 additional robbery calls were received in

the impact of the SCI on police activity. Such data are also used to examine the general displacement of crime.

³² Winter storms in February 2010 are the likely cause of the large decline in robberies during this time period.

the control compared to targeted locations (180 v. 85). And after the intervention, control locations experienced 223 CFS versus 158 in the targeted locations.

The current analysis confirms to a degree the work of MPD in their 2012 Annual Report, where they documented a decrease in robberies based on a comparison of changes in these five hot spots from 2011 to the same three month window in 2010. A reduction of close to 50% is noted when comparing the three months of robbery data in 2011 during the SCI, to the same three months in 2010. When including a control group, which MPD did not, the current analysis shows that these results are likely not part of some larger city-wide or seasonal trend. Indeed, descriptively, robberies in the controls remained relatively stable in the periods examined by MPD, whereas a dramatic decline was noted among the five locations targeted by the SCI.

Table 20: Change in Total Citizen-Generated Robbery Calls for Service

	Control	Target
CFS Robberies May – Jul 2010	175	165
CFS Robberies May – Jul 2011	180	85
% Change	+2.86%	-48.48%

When looking at these data by period-place and incorporating statistical significance tests, the results are similar. Robberies increase in the controls during the three month intervention, but decrease thereafter; whereas robberies in the hot spots decrease dramatically, but then increase after the SCI to near pre-intervention levels. These data, combined with the aforementioned relocation analyses, will help to discern changes caused by SCI, if any, in the stream of offending (detected by arrests).

Table 21: Robbery Calls for Service Per Hot Spot Per Month

	Target (SD)	Control (SD)	P-value
16 Months Before (n=160)	9.775 (8.5402)	10.2 (9.0251)	.7601
3 Months During (n=30)	5.6666 (2.7167)	12 (5.2915)	.0003
5 Months After (n=50)	8.32 (6.9924)	8.92 (7.3706)	.7691

The above results are largely confirmed when looking at the difference in differences (DiD) as well. DiD's compares changes in the control locations relative to changes in the hot spots. As previously discussed (see Chapter 4), this offers a number of potential advantages to simply comparing the two types of locations one point in time (eg, hot spot during v. control during). Among the three time periods examined (before→during, during→after, and before→after), statistically significant differences in citizen-generated robbery CFS between controls and hot spots are documented in the before→during and during→after time periods. During the SCI, control locations experienced an increase of nearly 2 robberies per location per month compared to the 16 months before, whereas targeted locations experienced 4.1 fewer robberies, for an average difference in difference of nearly six robbery incidents per location per month. In the five months after the SCI, control locations experienced over three fewer robbery calls per location per month, whereas targeted locations experienced an average increase of 2.65 offenses. Indeed, the effect of the SCI steadily washed away within the five month follow-up period, indicating some “residual deterrence” that predictably decayed (Sherman, 1990). No statistically significant difference was noted when looking at the before→after DiD, suggesting that the decrease in robberies within the targeted areas was

back up to “normal” levels by the end of 2011. This is not a unique finding as has been documented as early as Sherman (1990). The implications of this residual deterrence and decay are further explored in the discussion and conclusion.

Table 22: Robbery Per Hot Spot Per Month Difference in Differences

	16 Months Before	3 Months During	Difference	 DiD 	P-value
Control	10.2	12	+1.8	5.908	.0740
Target	9.775	5.6666	-4.1084	(n=190)	
	3 Months During	5 Months After			
Control	12	8.92	-3.08	5.733	.051
Target	5.6666	8.32	+2.6534	(n=80)	
	16 Months Before	5 Months After			
Control	10.2	8.92	-1.28	.175	.949
Target	9.775	8.32	-1.455	(n=210)	

The General and Specific Displacement of Robbery

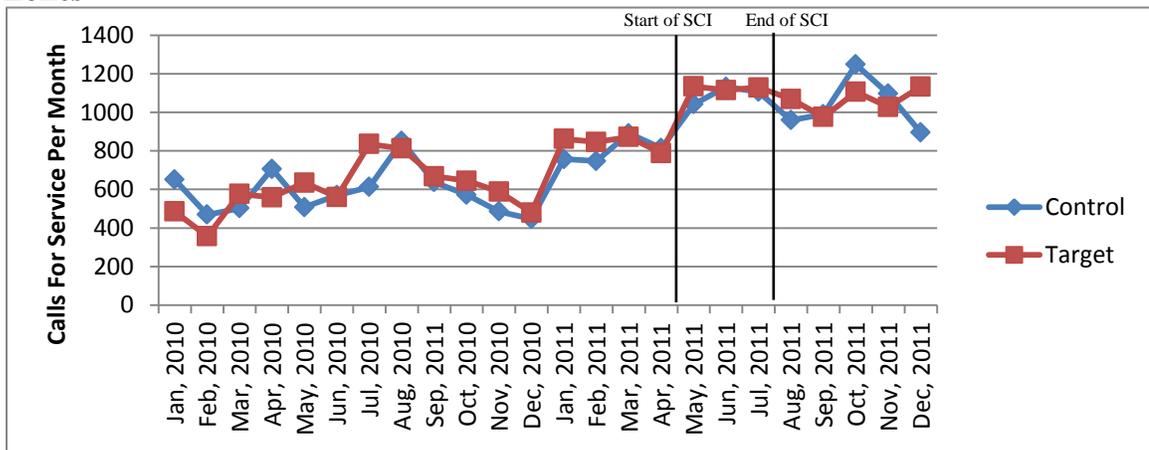
As the previous section documented, the 2011 Summer Crime Initiative reduced robbery in five hot spots during the three month intervention period compared to a group of five control hot spot locations. This next section examines whether this reduction in crime led to changes in its placement. While much previous empirical work seems to refute this possibility, these studies overwhelmingly rely on only capturing displacement within small two block buffer zones. Using a unique data set which allows for the linkage of an individual’s home location, to an offense location, to an arrest location over a two year period, the current work, in addition to examining local displacement, takes an approach allowing for the measurement of a broader range of outcomes. By capturing changes in individual home, offense, and arrest patterns, the current work tracks non-

adjacent or specific displacement beyond two blocks, avoiding the measurement issues and displacement assumptions discussed in Chapter 2. This two-method approach thus measures *general* adjacent displacement through traditional buffer zone approaches, as well as *specific* displacement, through the tracking of individual robbers throughout the city.

General Displacement

The first type of spatial displacement examined is general displacement, which tracks changes in the volume of crime within small two block (approximately 1000 feet) buffer zones amongst *any* offenders. There were a total of 37,876 citizen-generated CFS in the target and control buffers between 2010 and 2011. During this two year period, CFS track closely between the two locations with no prima face divergences before, during, or after the SCI, which suggests no obvious displacement effects.

Figure 11: Total Number of Citizen-Generated Calls for Service in Hot Spot Buffer Zones



Indeed, these offenses are highly correlated ($r=.9025$) when also looking robbery CFS ($r=.5055$) and instrumental CFS ($r=.6406$) (see Appendix for these tables). As discussed previously, the goal of focusing on robbery and instrumental sub-analyses is to link the

reductions in the target locations to “displaceable” offenses and offenders. When broken down by the period before, during, and after the SCI, the results again seem to suggest no obvious signs of general displacement. CFS across each category are slightly higher in the hot spot buffers before, during, and after the SCI with only minor changes in degree. For example, there were 3.8% more robbery CFS in the hot spots buffer zones before the SCI, but during there were 6.19% more, an increase of 2.39 percentage points. Similarly, before the SCI there were 2.51% more instrumental crime CFS in the hot spot buffers, but during there was 3.22% more, an increase of .71 percentage points. However, these data are merely descriptive.

Table 23: Total Number of Citizen-Generated Calls for Service in Hot Spot Buffer Zones

	Target Buffers	Control Buffers	% Difference
All CFS			
16 Months Before	10571	10220	+3.43%
3 During	3377	3280	+2.96%
5 After	5312	5188	+2.39%
Robbery CFS			
16 Months Before	737	710	+3.80%
3 During	103	97	+6.19%
5 After	237	224	+5.80%
Instrumental CFS			
16 Months Before	5358	5227	+2.51%
3 During	1187	1150	+3.22%
5 After	2009	1914	+4.96%

When looking at these data by period-place and incorporating statistical significance tests within a DiD framework, the results suggest crime was not displaced to areas immediately surrounding those targeted by the 2011 SCI. During the SCI, the number of calls for service per location per month did increase within the target buffers, but this was the case in the controls as well. The three months during the SCI experienced

92.99 more CFS per location per month for the buffer zones immediately surrounding the areas targeted by the SCI, but the controls buffers experienced an increase of 90.17 CFS per location per month. This increase is a typical seasonal pattern moving from spring to summer in many jurisdictions, and one that was not statistically significantly different from the pattern within the buffers that surrounded control locations. A complementary pattern is noted when moving from the summer months of the SCI to the fall and winter months during the five month follow up period. Hot spot buffers experienced a decrease of over 12 CFS per location per month, but the control buffers noted a similar such drop that was statistically indistinguishable. Finally, when looking at all CFS before and after the SCI, both control and hot spot buffers experience an increase that is again not statistically different from one another when looking at the DiD.

Table 24: Hot Spot Buffer Zone Difference-in-Differences All Calls for Service

	16 Months Before	3 Months During	Difference	 DiD 	P-value
Control	127.750	218.667	+90.917	2.079	.952
Target	132.137	225.133	+92.996	(n=190)	
	3 Months During	5 Months After			
Control	218.667	207.520	-11.147	1.507	.980
Target	225.133	212.480	-12.633	(n=80)	
	16 Months Before	5 Months After			
Control	127.750	207.520	+79.77	.572	.984
Target	132.137	212.480	+80.343	(n=120)	

When examining robbery and instrumental crimes no evidence of general displacement can be documented either. While the increase in robberies in the hot spot buffers may suggest general displacement, the increase is also evident within the control buffers. Hot spot buffers experienced .654 more robberies per location per month during

the SCI, which was less than the .772 more robberies per location per month noted in the control buffers, but not statistically significantly different from the .3 DiD. After the SCI, both hot spot and control buffers noted a decrease of .387 and .687 respectively, but again, this was not statistically significant. As with CFS in the aggregate, no statistically significant changes in the DiD can be found before→during, during→after, or before→after.

Table 25: Hot Spot Buffer Zone Difference-in-Differences Robbery Calls for Service

	16 Months Before	3 Months During	Difference	 DiD 	P-value
Control	8.875	9.647	+.772	.118	.913
Target	9.213	9.867	+.654		
	3 Months During	5 Months After			
Control	9.647	8.960	-.687	.3	.846
Target	9.867	9.480	-.387		
	16 Months Before	5 Months After			
Control	8.875	8.960	+.085	.183	.940
Target	9.213	9.480	+.267		

Finally, when looking at instrumental crimes, the results again are in line with the findings for all offenses and robbery. Instrumental crime CFS are up 12.158 in the hot spot buffers during the SCI, but a similar and statistically insignificant increase of 11.329 was noted in the control buffers when looking at the DiD. After the SCI, these values remained relatively stable within each type of buffer. Hot spots gained another 1.227 CFS per location per month, while controls lost .107, for a statistically insignificant DiD of 1.333. And after the SCI, both hot spots and controls gained an average of 11.222 and 13.385 instrumental crime CFS per location per month respectively, for another statistically insignificant DiD of .888.

Table 26: Hot Spot Buffer Zone Difference-in-Differences Instrumental Crime Calls for Service

	16 Months Before	3 Months During	Difference	 DiD 	P-value
Control	65.338	76.667	+11.329	.829	.963
Target	66.975	79.133	+12.158		
	3 Months During	5 Months After			
Control	76.667	76.560	-.107	1.333	.951
Target	79.133	80.360	+1.227		
	16 Months Before	5 Months After			
Control	65.338	76.560	+11.222	2.163	.888
Target	66.975	80.360	+13.385		

When examining crime displacement within buffer zones, there is no evidence that a large reduction in robbery within areas target by MPD led to changes in the placement of crime within areas immediately adjacent. These findings are typical of the literature on crime displacement (see Bowers et al., 2011) and are further explored in the next chapter.

Specific Displacement

While no general displacement was detected within small catchment areas, the next set of analyses focuses on displacement anywhere in the city, by following a cohort of 475 active robbers (244 active in the controls, 231 active in the targets) who were arrested in the 16 months prior to the SCI. Even at this broader level of analysis there appears to be no evidence of crime displacement, at least when using arrest as a proxy for offending. When looking at displacement for any offense type, 18.44% of the control cohort was rearrested for a new crime during the SCI compared to 16.45% amongst the hot spot cohort. The control cohort was actually slightly *more* likely than the target

cohort to get rearrested for a crime committed in a new location³³ during the SCI (14.43% versus 12.55%), contrary to what the displacement hypothesis would predict. Thus, robbers active in the hot spots were rearrested at lower rates during the SCI more generally, and were also less likely to relocate such behavior in locations outside one of the five crime hot spots. After the SCI, more targeted robbers were rearrested, but these events were not more likely to be relocated compared to the control cohort. These differences are not statistically significant and therefore cannot discern whether active robbers targeted were more or less likely to reoffend based on arrest patterns. While there are subtle differences, the P-values indicate the two groups are indistinguishable from one another.

As discussed in Chapter 2, the measurement of crime displacement needs to follow a framework derived from theory. While robbers may not displace their offending in any noticeable patterns when looking amongst all types of arrests, patterns may emerge when focusing in on specific crimes they are more likely to commit, such as additional robberies and instrumental crimes. As argued previously, these are offenses that seek to remedy one of main desires of robbers—the pressing need for cash. Again, even when looking at the relocation of a cohort of robbers by instrumental and more specifically robbery arrests, offenses they are most likely to recommit, there is no prima face evidence for displacement. While not statistically significant, the cohort of robbers from the areas targeted by the SCI were less likely to get rearrested for a new instrumental or robbery offense during the SCI in any location or in a new location.

³³ In this analysis new location is any place not contained within a control (for control cohort) or target (for target cohort) hot spot.

Table 27: Rearrest Rates (Any Offense) (n=475)

	Control (n = 244) (Percentage)	Target (n = 231) (Percentage)	P-value
16 Months Before	244 (100%)	231 (100%)	
3 Months During	45 (18.44%)	38 (16.45%)	0.5684
<i>New Location</i>	35 (14.34%)	29 (12.55%)	0.5682
5 Months After	51 (22.09%)	55 (23.81%)	0.4468
<i>New Location</i>	35 (14.34%)	30 (12.99%)	0.6689
8 Months During and After	90 (36.89%)	89 (38.53%)	0.7126
<i>New Location</i>	64 (26.23%)	55 (23.81%)	0.5432

Table 28: Rearrest Rates (Instrumental Crime) (n=475)

	Control (n = 244) (Percentage)	Target (n = 231) (Percentage)	P-value
16 Months Before	244 (100%)	231 (100%)	
3 Months During	10 (4.1%)	4 (1.73%)	0.1276
<i>New Location</i>	7 (2.87%)	4 (1.73%)	0.4094
5 Months After	12 (4.92%)	14 (6.06%)	0.5854
<i>New Location</i>	10 (4.1%)	4 (1.73%)	0.1276
8 Months During and After	22 (9.02%)	18 (7.79%)	0.6297
<i>New Location</i>	17 (6.97%)	8 (3.46%)	0.0875

Table 29: Rearrest Rates (Robbery) (n=475)

	Control (n = 244) (Percentage)	Target (n = 231) (Percentage)	P-value
16 Months Before	244 (100%)	231 (100%)	
3 Months During	5 (2.05%)	2 (.87%)	0.2870
<i>New Location</i>	4 (1.64%)	2 (.87%)	0.4534
5 Months After	7 (2.87%)	7 (.03%)	0.9180
<i>New Location</i>	5 (2.05%)	2 (.87%)	0.2870
8 Months During and After	12 (4.92%)	9 (3.9%)	0.5892
<i>New Location</i>	9 (3.69%)	4 (1.73%)	0.1913

The only marginally statistically significant (P-value = .0875) result occurs when looking at the rearrest rates in the eight months during and after among instrumental crimes. Robbers active in the hot spots prior to the SCI were less likely to get rearrested for a new instrumental crime in this eight month period compared to robbers active in the controls. As a further (if marginal) indication of deterrence rather than displacement, only 3.46 percent of active targeted robbers were rearrested for an instrumental crime in this eight month period compared to close to seven percent of robbers active in controls (n = 8 vs. 17). This is the only statistically significant evidence which suggests robbers targeted by the SCI were less, not more, likely to reoffend during and after the crackdown based on arrest patterns.

Changes in individual level displacement are also examined by looking at the journey to next offense. Of those active robbers who were rearrested, the distance between their last robbery before the SCI is compared to their first cleared offense location during and after the SCI. While few differences were noted in the prevalence of being rearrested or relocating, this next set of analyses attempts to uncover changes in the *degree* to which active robbers targeted by the SCI relocated their offending. Thus, while it may not be the case that active robbers targeted by the SCI were any more likely to relocate, it may change the distances traveled of those few who did reoffend.

Table 30: Changes in Arrested-Offense Location Distance (Meters) (All Cleared Offenses)³⁴

	Control (SD)	Target (SD)	P-value
Prior → During (n=83)	3201.6550 (3110.0159)	3043.2211 (2897.0833)	.8121
Prior → After (n=106)	2759.5736 (3233.7904)	2358.1421 (2138.7765)	.4496

³⁴ Results are suppressed when looking at changes in the offense location for new robbery and instrumental crimes because of the low reoffense rates.

Results from this analysis indicate that active robbers targeted by the SCI were no more likely to change the degree to which they relocated their offending based on those who were rearrested. Active robbers' next offense during and after the SCI was not statistically significantly different from the distance between control robbers' next offense either during or after. Indeed, while not statistically significant, the results are in the opposite direction as predicted. Active robbers in hot spots traveled a shorter distance than their control counterparts in this sample.

Finally, changes in the offense stream among the target and control robbers are examined. As discussed further in Chapter 4, such an analysis seeks to uncover three specifics with regard to the offending streams of the treated and control robbers: 1) does the proportion of locations for crimes individuals are arrested for change during or after the SCI?; 2) Are targeted offenders choosing completely new locations to commit crimes in greater proportions than those not targeted?; 3) Does the intermittency of offending (days between cleared offenses) change?

Table 31: Changes in Arrested-Offense Stream (All Cleared Offenses)

	% of arrested-offenses outside targeted hot spots³⁵			
	Before (n = 231)	During (n = 38)	After (n = 55)	During/After (n = 89)
Target	69.6970	76.3158	54.5455	61.7978
	% of arrested-offenses outside control hot spots			
	Before (n = 244)	During (n = 45)	After (n = 51)	During/After (n = 90)
Control	64.3443	77.6667	68.6275	71.1112
Target v. Control P-value	.2149	.5686	.1362	.1868

³⁵ Targeted and control hot spots are based on the single location (of the 10) which brought the robber into the study during the 16 months preceding the SCI.

Descriptively, offenders targeted by the SCI committed the greatest share of the offenses they were arrested for outside of the areas targeted during the three month intervention. While 69% were arrested for crimes committed outside the SCI before the crackdown, this percentage went up to 76% during the three month intervention. However, similar increases were noted among the control cohort as well, who committed 64% of their crimes in the control areas prior to the SCI, but over 77% thereafter. These increases may therefore be a seasonal effect, such that offenders are more mobile during the summer months when its warmer out and perhaps more conducive to traveling. Moreover, no statistically significant differences are noted within each of the four time periods examined, which seems to suggest no disruptions to the offense stream that would lead to crime displacement.

Table 32: Changes in Arrested-Offense Stream New Locations (All Cleared Offenses)

	% of arrested-offenses in completely new location³⁶		
	During (n = 38)	After (n = 55)	During/After (n = 89)
Target	13.1578	10.9090	12.3595
	% of arrested-offenses in completely new location		
	During (n = 45)	After (n = 51)	During/After (n = 90)
Control	15.5555	11.7647	14.4444
Target v. Control P-value	.7565	.888866	.6818

Robbers targeted by the SCI do not appear to be getting rearrested for crimes committed in new locations in any greater proportion than control robbers. Those targeted by MPD were rearrested for crimes in new locations just over 13% of the time,

³⁶ In this analysis new locations are based on the Police Service Area (PSA) where the crime was committed. Offenses are labeled as occurring in a completely new location if the individual has no record of being arrested for an offense occurring in this PSA since 1995.

compared to 15% for controls. These differences were not statistically significantly different. Similarly, no differences were noted after or during and after the SCI. While robbers targeted by the SCI were less likely to get rearrested for new crimes in locations they have not been active before, a direction opposite than predicted, none of these results are statistically significant.

Table 33: Changes in Offense Intermittency (Days Between Cleared Offenses)

	Control (SD)	Target (SD)	P-value
16 Months Before	409.74 (312.2146)	416.64 (339.2851)	.8176
n	244	231	
Last Arrested- Offense Before SCI to Next Offense During	194.3716 (148.6159)	221.2846 (164.4764)	.4361
n	45	38	
Last Arrested- Offense Before SCI to Next Offense During or After	321.2458 (284.1486)	309.1864 (290.1684)	.7791
n	90	89	

Targeted offenders did not exhibit any statistically significant changes in their cleared offense intermittency compared to controls.

Among those who were arrested, there is no evidence that active robbers in crime hot spots relocated their offending any differently than those active robbers from the controls. Given these results, the current work does not explore hypothesis IV in Chapter 2 which related to identifying specific places where crime displacement is more likely to occur. Such an exploration is viewed as being conditional upon finding evidence for displacement in the first place. Such evidence was not uncovered therefore these hypotheses are not explored.

To summarize, there is no evidence to support the displacement hypothesis in this analysis. Robbers who were arrested in areas targeted by the SCI were subsequently rearrested at rates no greater than an equivalent control group despite large reductions in such offenses in the places these robbers were previously active. Additionally, these targeted robbers did not exhibit differences in their share of cleared offenses committed outside the targeted hot spots compared to controls in control hot spots, nor were there any changes in the timing between cleared offenses.

Indeed, virtually all the results, while not statistically significant, provide support for the contrary hypotheses put forth in this dissertation. In the 18 comparisons made between active control and target robbers (Tables 28-31) during, after, and during and after the SCI, those robbers targeted by the SCI had lower re-arrest and re-location rates in 15 of such comparisons. Moreover, the only marginally statistically significant difference was in the opposite direction from that predicted by the displacement hypothesis. When examining re-arrest rates in new locations for all instrumental crimes, the evidence showed that, active robbers in target hot spots were *less* likely to relocate their offending to a new location compared to active robbers in the controls in the eight months during and after the 2011 SCI.

Chapter 6: Discussion and Conclusions

Robbery is a deeply visceral crime and instills fear in many communities which may potentially cripple opportunities for them to generate a consensus around normative behavior, develop informal social control, and secure outside economic investment. Residents in these communities frequently move, if they can, and victims of such crimes often suffer from trauma long after the incident. Robberies are notoriously difficult to solve despite clustering in certain areas of the city well known to the police. Therefore, many law enforcement agencies seek to *prevent* such offenses by targeting their activity in these crime hot spots. Indeed, such approaches have widely diffused among larger police departments and have recently been cited as the most commonly used tactic to combat violent crime (PERF, 2008).

Using a quasi-experimental research design, the current work documented a similar approach in Washington D.C. called the Summer Crime Initiative. This three month arrest driven crackdown led to a statistically significant and large (Cohen's $d = -1.5058$) decrease in citizen-generated robbery calls for service during a three month intervention period. Crime in the areas targeted by the SCI was down over 52%³⁷ compared to similar areas not receiving such increased scrutiny by police. These findings are in line with the majority of research to date (see Braga et al., 2012). Whether such reductions are illusory remains an important policy question, as a major criticism over such approaches is that they merely displace crime to untreated areas of a jurisdiction.

Research has refuted such claims, consistently demonstrating no appreciable displacement in response to hot spots policing initiatives (Bowers et al., 2011). However,

³⁷ Cohen's d and the percentage change are based on citizen-generated robbery calls for service per month per location averages. See Table 21: Robbery Calls for Service Per Hot Spot Per Month.

this body of knowledge has overwhelmingly examined the potential of police efforts in crime hot spots to displace crime using typically small two block catchment areas. Little is thus known about these interventions potential to displace crime beyond such small areas. This work set out to more robustly test geographic crime displacement in reaction to a pro-arrest police crackdown by tracking changes in offense patterns both locally and non-locally. Using a unique data set from the Washington D.C. Metropolitan Police Department, the current work was able to track changes in individual offender's crime location patterns, allowing for the testing of both adjacent and non-adjacent displacement.

While no theory of crime displacement exists, the current work developed testable hypotheses built upon an analytic framework based on Situational Action Theory (Wikström et al., 2012), Routine Activities Theory (Cohen and Felson, 1979), and important research on the target selection properties of robbers (Conklin, 1972; Feeney, 1986; Gill, 2000; Jacobs and Wright, 1999; Matthews, 2002; Morrison and O'Donnell, 1994; Wright and Decker, 1997). This research revealed several characteristics of places where crime is most likely to occur and presumable where it is most likely to relocate when offenders previous crime opportunities are blocked through police action. Specifically, two hypotheses were generated with regards to the displacement of crime in response to reductions in robbery:

Hypothesis 1: As a result of the SCI's impact on robbery, crime in buffer zones immediately surrounding the SCI targeted sites will experience increased levels of

robbery and instrumental crimes relative to control buffers, but show no appreciable differences when examining the displacement of total crime.

Hypothesis 2: When tracking a cohort of active robbers, some of those targeted by the SCI will displace their behavior in ways unable to be captured using two block buffer zones. The places such non-adjacent behavior is most likely to occur includes: locations they current or formerly live; areas with a similar economic and racial background as their own; and areas within 1000 feet of a bar, ATM/bank, liquor store, or college campus.

This dissertation found evidence that seems to falsify both of these hypotheses. Substantial reductions in robbery during the crackdown period were achieved without displacing offenders generally in locations immediately surrounding the areas targeted, or to any other locations in the city amongst a cohort of active robbers. Rates of crime in the buffer zones surrounding the areas targeted by the SCI displayed no statistically significant differences from buffer zones surrounding matched untreated controls. Similarly, the 231 active robbers from the areas targeted by the SCI were no more or less likely to relocate their offending during or after the SCI compared to the 244 robbers active in the controls based on those who were rearrested. While no statistically significant differences emerged, they were virtually all in the direction favoring the deterrence and falsifying the displacement hypothesis. Active robbers targeted by the SCI were less likely to be rearrested during and after the three month initiative in 15 of the 18 comparisons made (Tables 28-31). Finally, there was no evidence that changes in the

offense streams of those targeted by the SCI were disrupted in such a way that would cause more cleared offenses to be relocated to areas not targeted by MPD.

These results further support the literature to date on these types of interventions, which have found very little evidence that crime just “moves around the corner” (see Bowers et al., 2011). As stated above, much of this literature focuses on localized displacement within small two block buffer zones. The current work is able to extend the boundaries of these findings amongst a sample of active robbers, by finding that these offenders targeted by a police crackdown in a crime hot spot were not just deterred from committing crime in the target locations and smaller surrounding areas, but were prevented from committing subsequent crime anywhere in the city.

Limitations

The aforementioned findings must be viewed in light of certain limitations, of which several are related to the lack of available data to track specific displacement. While the current work documented little evidence of crime displacement when tracking a cohort of active robbers, Washington D.C. is less than 70 square miles, with porous borders particularly among Wards 7 and 8 where a few of the SCI sites are located. Among police practitioners at MPD it is commonly acknowledged that there is a degree of cross pollination of offenders between Wards 7 and 8 with Prince George’s County. Even Chief Cathy Lanier has stated that D.C. and PG County, “share many of the same issues” with “quite a few of our [DC] victims (coming) from Prince George’s County” (Klein and Zapotosky, 2011). Even though over 80% of offenders in the current analysis live at least 2.5 miles from the Prince George’s County border, tracking offenders into the next county would have provided stronger evidence regarding any non-adjacent

displacement hypotheses. This problem is likely to plague many studies of crime displacement without cooperation and data from surrounding jurisdictions, or from such multi-agency data-sharing systems as the Washington Area Law Enforcement System (WALES), which includes all county and city police agencies bordering the District. It can always be argued that offenders moved beyond even these additional geographies, but given the known spatial extent of robbers through analyses of their journey-to-crime (Conklin, 1972; Van Koppen and Jansen, 1998), the vast majority of crime displacement should be captured within the current work. Regardless, collecting data from a larger geography would help alleviate some of these concerns.

However, even with additional data from neighboring jurisdictions, displacement at the individual level is harder to disprove. As Black and Park have noted, “It is difficult to disentangle whether the absence of displacement effects is a result of a true reduction in crime or a result of criminals responding to the interventions by exerting more effort to avoid detection or simple problems of measurement (2012, p.330).”

The current work is based on official crime data, which is problematic for a variety of reasons (see Mosher et al., 2011). Importantly, many crimes are not cleared by police, with fewer than 30% of robberies in Washington D.C. having a known offender (FBI, 2013). Rates for other instrumental crimes are even worse. For example, according to MPD’s 2012 Annual Report, less than 10% of burglaries are cleared through arrest. In Peterborough the clearance rates may be even lower. When comparing self versus police reported crime within the Peterborough study, participants admitted to 450 robberies, but only a single youth had an official arrest record for any such incidents (Wikström et al., 2012, p.114).

Robberies in particular are notoriously difficult to solve. Eye witness testimony is becoming a low standard of evidence in the courts, especially in light of recent advances in the fallibility of inter-racial identification (see Meissner and Brigham, 2001), offenders often wear masks, attack at night, and leave no forensics at the scene of the crime. Without offenses being cleared through arrest, there is no way for the current work to link robbers to displaced crimes. Thus, it is entirely possible that crime displacement did occur within Washington D.C., but due to additional precautions taken by the cohort of active robbers, they were never actually arrested³⁸. This problem affects studying displacement at the individual level, but not within the buffer zones examined, since it does not rely on offenses being cleared. However, a similar limitation of using official data arises in the low victim reporting rates. Approximately 50% of all violent offenses never get reported to police (Mosher et al., 2011). This may be particularly problematic amongst the offenders in the current sample. Research has shown that robbers often favor to select targets not likely to contact the police, such as drug dealers (Jacobs, 2000).

Finally, the observational nature of the current work prevented the randomization of treatment and direct observation of police activities in the crime hot spots. While controls were matched to hot spots, there is always a possibility that unobserved differences contributed to the documented reductions in robbery. More importantly, without observing police activity, there is no way to determine what they were doing in these crime hot spots. This is important, especially in the light of a recent Campbell Collaboration Review which documented differences in hot spots policing interventions that used problem-oriented versus saturation patrol approaches (Braga et al., 2012). The

³⁸ Decreases in clearance rates in the targeted hot spots may be suggestive of offenders changing their methods to avoid police detection. However, no changes in clearance rates between the control and hot spots were noted before, during, or after the SCI.

lack of displacement noted in the current work may be limited to the responses chosen by MPD, which may not apply to other tactics used in hot spots. In the future it may be informative to examine crime displacement by the type of hot spots intervention. The current work also documented a strong decaying of deterrence in the hot spots. It may be the case that police interventions that last longer and provide more than an ephemeral reduction in crime, may displace more offenders once they recognize that the current intervention is not just temporary.

Future Research

Future research can help confirm and extend the current work's findings by addressing several of its limitations. Research that can measure crime through self-reports will be better positioned to capture relocated offenses, which are likely underreported in the current study. Victims only report a fraction of all crimes to the police, who in turn only arrest a yet smaller portion of all offenders. Moreover, if active robbers who are targeted by the police take additional precautions clearance rates will only decrease. Thus, when using official data it becomes hard to discern whether no displacement was identified because none occurred, or whether no displacement was identified because it was not detected by police. A clear parsing of these two competing hypotheses through self-report data would help strengthen the current work's findings.

Such research can also seek to directly measure not only the criminal behavior of offenders, but changes in their decision making and criminal propensity. This information would help unpack why robbers in the current study were not apparently relocating their offending. More data could help separate those who may have desisted because they were deterred by the prospect of apprehension by police, those who were deterred by the

prospect of searching out new targets, and those who were not deterred but nonetheless were unable to identify other suitable locations (with a lack of capable guardians and presence of suitable targets).

Additional research can also help to identify police tactics in crime hot spots that could potentially have longer lasting impacts. This might occur not just by blocking crime opportunities temporarily, but by changing a person's motivation, which may ultimately provide the best means to prevent crime displacement and achieve sustained reductions in crime. In other words, crackdowns might be designed to aim for desistance, and not just deterrence. The current work's sole focus on an arrest-based approach could be compared with other police-led initiatives, evaluated on the basis of their differential impact on offender decision-making.

Further research may also uncover how police crackdowns affect co-offending robbers, who may respond differently than lone offenders. Findings from Peterborough (2012) indicate that youth are most likely to commit crime when they are in unstructured settings with their peers. The least displaceable (and most deterrable) robbers may thus be those who co-offend or spend more time with their peers. While the current work found a reduction in robbery with no subsequent displacement, policing activities that target robbers more likely to reoffend, such as those with co-offenders, may have an even larger impact. Police may be able to construct social networks to identify and target the most connected robbers. Such work has been employed in gang-oriented initiatives with success (Braga et al., 2001; Braga et al., 2005) and could potentially be extended to robbery interventions.

Additional research can examine the displaceability of robbers versus people who commit other offenses. The current work is purposively narrow in scope. While there is no evidence to suggest robbers relocate their offending in response to a police crackdown, there may be other types of offenders that are in fact displaceable. Another way to approach such an inquiry is to move beyond offender-offense typologies (robbers, burglars, car thieves, etc) and examine criminals more generally. There may be characteristics that are related to the relocation of offending for all criminals such as age at first offense, gender, current age, prior criminal record, transience, marriage history, employment history, etc. Indeed, there is a great deal of information from life-course criminology which can help guide such research (Laub and Sampson, 2003; Piquero et al., 2007; Sampson and Laub, 1993). Selecting a cohort for study by conditioning on such variables may yield useful information regarding the types of offenders most likely to relocate in the face of police crackdowns (On the other hand, it may put another nail in the crime just moves around the corner coffin). With such information, police can not only target places where crime clusters, but also the offenders active in such places that are most likely to displace their offending. Such approaches as the SCI may only be efficacious amongst certain types of offenders and therefore should not be used to combat all crime problems.

While the current work documented a quick dissipation of the crime reductions caused by the SCI, it is unclear what longer term impacts MPD's intermittent arrest crackdown policy may have on the targeted communities. Pro-arrest policies and other similar law and order tactics such as stop and frisk have strained police-community relationships in many communities both historically (Kerner, 1968) and more recently in

cities such as New York. Notably, in New York City (NYC), citizens have long complained about race-based discriminatory tactics employed under former Mayor Michael Bloomberg and former Police Commissioner Ray Kelly (see Fitzsimmons, 2013). The NYC Police Department may be losing the trust and confidence of its citizens (see *Floyd v. City of New York*), which would be counter-productive to their crime prevention efforts.

The work of Tom Tyler (1990, 2004) on legitimacy may be relevant to the current works focus on the 2011 SCI. Tyler and other researchers have found that citizens who believe the police are a legitimate authority, “authorize that authority to determine what their behavior will be within a given set of situations” (Tyler, 2004, p.87). Citizens thus behave not because they are deterred, but because they feel obligated to do so through their trust, confidence, and belief in the police as a legitimate authority. The dramatic rise in arrests because of the SCI could potentially erode this legitimacy, and be penny wise but pound foolish. Longer term follow-ups using official crime data and surveys of citizens in neighborhoods targeted by the SCI could help inform changes within future SCIs that seek the community’s support, build their trust, and ensure the police are viewed as a legitimate authority.

Finally, future research on displacement should utilize an experimental design where treatment is randomly assigned amongst locations. Such an approach would help to rule out alternative explanations. If done prospectively researchers can better measure the activity of the police in more qualitative ways that may provide insights into the types of police activities that are more successful in reducing robbery and whether these can have longer lasting impacts than those observed with the 2011 SCI. It would also afford

the opportunity to obtain self-reported data from robbers as well as insights into their decision making and changes to their decision making. Such work may also help to identify offenders who were planning on committing a robbery, but did not because of the SCI. This would perhaps disentangle the impact of similar initiatives on the participation versus prevalence of offending.

Policy Implications

Hot spots policing is the most commonly used tactic to combat violent crime. While crime displacement has long been a criticism of these interventions, the current work adds to a long list of studies that refute this criticism. Evidence from the current work indicates that police can reasonable implement similar initiatives targeted at robbers and reduce crime without displacement. This added reassurance means police should continue to use these interventions. However, such arrest-driven initiatives tend not to have lasting effects, often decaying in the months immediately after the crackdown. This was true in the current work and other such efforts (see Sherman 1990).

If police are going to reduce crime more permanently, a different approach may need to be taken. A more successful policing intervention for a lasting impact on crime might presume that arrests alone are not a panacea. Some departments are already varying the tactics they use in crime clusters. The best evidence to date indicates that departments which take a problem-oriented approach not only reduce crime without displacement, but are able to sustain such declines more permanently (Braga et al., 2012). The Metropolitan Police Department and law enforcement agencies more generally could utilize such approach in the future in controlled comparisons to arrest-focused tactics. This type of approach can address environmental, neighborhood, and individual level risk

factors. Police may need to alter the environment in more permanent ways by increasing the lighting, changing patterns of foot traffic, cutting back shrubs, or increasing the usage of CCTVs. Such approaches are commonly referred to as Situational Crime Prevention (Lab, 2010), and have been implemented in a number of successful problem-oriented policing approaches (Center for Problem-Oriented Policing, 2014; Weisburd et al., 2008).

Beyond targeting crime hot spots, MPD and other departments may be able to achieve more lasting impacts if they focus on specific robbers and offenders. Such an approach is particularly germane in the current work, where MPD focused their efforts not on environmental or sociological factors that are underlying the rates of crime in the places targeted, but instead focused on arresting individuals who happened to be in these locations. Thus, the police used place-based crime clusters, but individual level tactics. A more effective approach could attempt to marry the two. One such approach could leverage the environmental approaches discussed above with an individual and group level strategy, Operation Ceasefire (Boston), which has gained national attention and has been labeled an evidence-based practice by the National Institute of Justice. This initiative is based on what David Kennedy (2011, p.53) calls “coerced demand reduction,” which is essentially group-level deterrence. High rate offenders in Boston who were responsible for a disproportionate share of violent crime and shootings were called into a meeting of police, prosecutors, community members, and influential people in their lives, and given a chance to turn their behavior around or face a united and coordinated criminal justice response. Other cities could emulate Boston’s engagement of community stakeholders and non-profits to help alleviate the “pressing need for cash” many robbers experience by providing jobs, workforce development, and advocacy that

can include securing federal entitlements and welfare. Community members in Washington D.C. often work closely with employers who are willing to look past a person's criminal history, and proposed legislation to "ban the box" (DC Council) which could help eliminate the barrier altogether.

Finally, one unique approach being used nationally attempts to dry up the secondary market for stolen cell phones by making them inoperable, colloquially referred to as "bricking." Law enforcement agencies in coordination with the Federal Communication Commission pressured cell phone carriers such as Verizon and AT&T to disable the phones of their customers if reported stolen (FCC, 2013). This effort essentially renders the phones useless which in-turn may dramatically reduce their value or reward for robbers. Similar efforts can be undertaken for other commonly robbed goods, with the police and regulatory agencies additionally cracking down on stores who distribute stolen merchandise.

Whatever else might be done to prevent crime in hot spots, the issue of displacement will remain a central concern. By taking a unique approach to the measurement of crime displacement locally and more globally throughout an entire city, the current work documented no evidence of offense relocation. This is an important extension of the prior research which almost universally focuses on displacement within small typically two block buffer zones, and suggests that police can prevent crime without measurable displacing it within the city limits. However, such results are the first of its kind and need to be replicated to both confirm and extend this work.

Appendix

Appendix 1: DC Code and UCR

DC CODE INDEX OFFENSE DEFINITIONS	FBI UCR PART I CRIME DEFINITIONS
<p>The MPD relies on the DC Code Index Offenses for daily operational and deployment decisions. Offenders who are arrested in the District of Columbia are prosecuted for the offenses represented in the DC Code.</p>	<p>The UCR provides a consistent measure of serious crime that can be compared across time periods or regions.</p>
<p>Homicide: Killing of another purposely, in perpetrating or attempting to perpetrate an offense punishable by imprisonment, or otherwise with malice aforethought.</p>	<p>Murder: The willful non-negligent killing of a person.</p>
<p>Sex Assault: One of many sexual acts against another, either forcibly or without his/her permission, and/or against someone who is otherwise incapable of communicating unwillingness.</p>	<p>Forcible Rape: The carnal knowledge of a female forcibly and against her will.</p>
<p>Robbery: The taking from another person, or immediate actual possession of another, anything of value, by force or violence, whether against resistance or by sudden or stealthy seizure or snatching, or by putting in fear. This category includes carjackings.</p>	<p>Robbery: The taking or attempting to take anything of value from the care, custody, or control of a person or persons by force or threat of force or violence and/or by putting the victim in fear.</p>
<p>Assault with a Dangerous Weapon (ADW): Knowingly or purposely causing serious bodily injury to another person, or threatening to do so; or under circumstances manifesting extreme indifference to human life, knowingly engaging in conduct that creates a grave risk of serious bodily injury to another person, and thereby causes serious bodily injury. Weapons include, but are not limited to, firearms, knives and other objects.</p>	<p>Aggravated Assault: An unlawful attack by one person upon another for the purpose of inflicting severe or aggravated bodily injury. This type of assault is usually accompanied by the use of a weapon or by means likely to produce death or great bodily harm.</p>
<p>Burglary: Breaking and entering, or entering without breaking, any dwelling, bank, store, warehouse, shop, stable, or other building or any apartment or room, whether at the time occupied or not, or any steamboat, canal boat, vessel, other watercraft, railroad car, or any yard where any lumber, coal, or other goods or chattels are deposited and kept for the purpose of trade, with intent to break and carry away any part thereof or any fixture or other thing attached to or connected with the same.</p>	<p>Burglary: The unlawful entry of a structure to commit a felony or theft.</p>
<p>Theft/Other: This includes conduct previously known as larceny. The Theft/Other category excludes theft of items from a motor vehicle or the motor vehicle itself, which are captured under other categories, and excludes fraud.</p>	<p>Larceny/Theft: The unlawful taking, carrying, leading or riding away of property from the possession or constructive possession of another.</p>
<p>Theft F/Auto: Theft of items from within a vehicle, excluding motor vehicle parts and accessories.</p>	
<p>Stolen Auto: Theft of a motor vehicle (any automobile, self-propelled mobile home, motorcycle, truck, truck tractor, truck tractor with semi trailer or trailer, or bus).</p>	<p>Motor Vehicle Theft: The theft or attempted theft of a motor vehicle. "Motor vehicle" includes automobiles, trucks and buses, and other self-propelled vehicles that run on land surfaces and not rails.</p>
<p>Arson: The malicious burning or attempt to burn any dwelling, house, barn, or stable adjoining thereto, or any store, barn, or outhouse, or any shop, office, stable, store, warehouse, or any other building, or any steamboat, vessel, canal boat, or other watercraft, or any railroad car, the property, in whole or in part, of another person, or any church, meetinghouse, schoolhouse, or any of the public buildings in the District, belonging to the United States or to the District of Columbia.</p>	<p>Arson: Any willful or malicious burning or attempt to burn, with or without intent to defraud, a dwelling house, public building, motor vehicle or aircraft, personal property of another, etc.</p>

Appendix 2: Hot Spot and Control Census Tract Crosswalk

Hot Spot	Census Tract
501	33.02
	46.00
	48.01
	48.02
	47.01
504	88.02
	88.04
	89.03
	89.04
602	78.07
	78.08
604	77.07
	99.07
706	97.00
	98.02
	98.10
	98.11
Control	
1	28.01
	28.02
	29.00
	30.00
	31.00
2	91.02
3	77.03
	77.08
	96.03
4	73.04
	74.03
	74.04
	74.09
5	98.04
	104.00

Appendix 3: Average Arrests Per Month in SCI

Arrest Category	Before	During	% Change
Aggravated Assault	11.94	16.33	36.82%
Burglary	2.75	3.00	9.09%
Disorderly Conduct / POCA	36.06	60.67	68.23%
Gambling	0.00	0.33	
Larceny/Theft	3.88	6.33	63.44%
Liquor Laws	0.06	0.33	433.33%
Narcotic Drug Laws	129.44	189.00	46.02%
Rape/Sexual Abuse	0.19	1.00	433.33%
Release Violations/Fugitive	39.44	75.33	91.02%
Robbery/Carjacking	5.31	7.33	38.04%
Simple Assault	40.81	49.00	20.06%
Stolen Property	2.06	2.33	13.13%
Theft from Auto	0.44	1.33	204.76%
Traffic Violations	72.94	112.33	54.01%
UUV	7.56	12.67	67.49%
Vandalism	4.69	6.33	35.11%
Vending Violations	0.88	2.00	128.57%
Weapons	6.81	10.67	56.57%

Appendix 4: Hot Spot City Comparison

Population / Geography	DC	Philadelphia	Sacramento	Jacksonville	Lowell	Jersey City	Minneapolis	Kansas City	Indianapolis
Population	601,723	1,526,006	466,488	821,784	106,519	247,597	382,578	459,787	820,445
Persons under 18 years	17.00%	22.50%	24.90%	23.90%	23.70%	21.10%	20.20%	24.20%	25.00%
Persons 65 years and over	11.40%	12.10%	10.60%	10.90%	10.10%	9.00%	8.00%	11.00%	10.50%
Female persons, percent	52.70%	52.80%	51.30%	51.50%	50.40%	50.60%	49.70%	51.50%	51.70%
Land area in square miles, 2010	61.05	134.1	97.92	747	13.58	14.79	53.97	314.95	361.43
Persons per square mile, 2010	9,856.50	11,379.50	4,764.20	1,100.10	7,842.10	16,736.30	7,088.30	1,459.90	2,270.00
Race									
White	35.30%	36.90%	34.50%	55.10%	52.80%	21.50%	60.30%	54.90%	58.60%
Black	50.70%	43.40%	14.60%	30.70%	6.80%	25.80%	18.60%	29.90%	27.50%
Hispanic or Latino	9.50%	12.30%	26.90%	7.70%	17.30%	27.60%	10.50%	10.00%	9.40%
Asian persons	3.70%	6.30%	18.30%	4.30%	20.20%	23.70%	5.60%	2.50%	2.10%
American Indian and Alaska Native	0.60%	0.50%	1.10%	0.40%	0.30%	0.50%	2.00%	0.50%	0.30%
Native Hawaiian and Other Pacific Islander	0.10%	Z	1.40%	0.10%	Z	0.10%	Z	0.20%	Z
Persons reporting two or more races	2.50%	2.80%	7.10%	2.90%	3.60%	4.40%	4.40%	3.20%	2.80%
Foreign born persons, percent, 2006-2010	13.00%	11.50%	22.20%	9.20%	24.60%	38.20%	15.10%	7.50%	8.10%
Lang other than English spoken at home, % age 5+, 2006-2010	14.60%	20.90%	36.60%	12.90%	42.50%	52.00%	19.60%	11.60%	11.50%
Education									
High school graduates, percent of persons age 25+, 2006-2010	86.50%	79.40%	81.40%	86.90%	77.70%	83.10%	87.90%	86.40%	83.70%
Bachelor's degree or higher, pct of persons age 25+, 2006-2010	49.20%	22.20%	29.60%	24.00%	22.70%	39.60%	43.60%	29.60%	27.30%
Housing									
Living in same house 1 year & over, 2006-2010	80.00%	86.00%	76.60%	79.90%	81.60%	83.70%	73.90%	79.90%	79.70%
Housing units, 2010	298,902	670,171	190,911	366,273	41,431	108,720	178,287	221,860	379,856
Homeownership rate, 2006-2010	43.50%	55.30%	50.60%	63.20%	49.80%	32.20%	50.80%	58.20%	58.10%

Housing units in multi-unit structures, percent, 2006-2010	61.70%	32.80%	32.20%	28.20%	61.50%	84.20%	51.00%	30.20%	31.70%
Median value of owner-occupied housing units, 2006-2010	\$443,300	\$135,200	\$311,900	\$171,500	\$249,700	\$360,400	\$228,700	\$135,000	\$122,100
Households, 2006-2010	257,317	574,488	173,938	311,064	38,978	93,026	167,141	192,695	324,474
Persons per household, 2006-2010	2.12	2.53	2.59	2.55	2.59	2.59	2.17	2.33	2.44
Income									
Per capita money income in past 12 months (2010 dollars) 2006-2010	\$42,078	\$21,117	\$25,427	\$25,227	\$22,730	\$30,490	\$29,551	\$25,683	\$24,334
Median household income 2006-2010	\$58,526	\$36,251	\$50,267	\$48,829	\$50,192	\$54,280	\$46,075	\$44,113	\$43,088
Persons below poverty level, percent, 2006-2010	18.50%	25.10%	17.30%	14.30%	17.50%	17.50%	22.70%	18.10%	17.90%

Appendix 5: Experimental and Control Hot Spots Demographics

	Census Tract	Hot Spot	Experimental / Control	Area with HS/Control	% within HS/Control	Total Area	% of HS/Control
	33.02	501	Experimental	198,608	100%	198,608	1,242,150.91
	46	501	Experimental	428,943		436917.338256	15.99%
	47.01	501	Experimental	220,560		321218.203507	
	48.01	501	Experimental	227,083		317459.981357	
	48.02	501	Experimental	80,183		288098.105378	
Population	Total Population	2134	3028	3986	2143	2922	
	Pop 15 to 19 years	67	153	263	51	147	
	% Pop 15 to 19 years	3.1	5.1	6.6	2.4	5	
	Pop 20 to 24 years	272	343	352	234	339	
	% Pop 20 to 24 years	12.7	11.3	8.8	10.9	11.6	
	Pop 25 to 29 years	331	433	530	372	457	
	% Pop 25 to 29 years	15.5	14.3	13.3	17.4	15.6	
	Median age (years)	32.7	32.7	30.9	34	32.9	
	Pop 18 years and over	1856	2537	3066	1934	2492	
	% Pop 18 years and over	87	83.8	76.9	90.2	85.3	
	Pop 62 years and over	178	310	584	290	347	
	% Pop 62 years and over	8.3	10.2	14.7	13.5	11.9	
	Male Pop 15 to 19 years	33	81	118	34	74	
	% Male Pop 15 to 19 years	1.5	2.7	3	1.6	2.5	
	Male Pop 20 to 24 years	128	175	158	110	150	
	% Male Pop 20 to 24 years	6	5.8	4	5.1	5.1	
	Male Pop 25 to 29 years	163	238	232	189	244	
	% Male Pop 25 to 29 years	7.6	7.9	5.8	8.8	8.4	
	Median age (years)	32.7	31.7	30.2	35.1	32	

	Male Pop 18 years and over	946	1298	1316	1037	1194
	% Male Pop 18 years and over	44.3	42.9	33	48.4	40.9
	Male Pop 62 years and over	73	114	214	119	117
	% Male Pop 62 years and over	3.4	3.8	5.4	5.6	4
	Pop White	792	883	636	921	923
	% Pop White	37.1	29.2	16	43	31.6
	Pop Black or African American	1273	2024	2799	1011	1512
	% Pop Black or African American	59.7	66.8	70.2	47.2	51.7
	Pop Hispanic or Latino (of any race)	128	221	108	191	223
	% Pop Hispanic or Latino (of any race)	6	7.3	2.7	8.9	7.6
	# Occupied housing units	887	1268	2002	1078	1382
	% Occupied housing units	90.3	86.6	93.6	89.2	88.5
	# Vacant housing units	95	197	136	130	179
	% Vacant housing units	9.7	13.4	6.4	10.8	11.5
Housing	Rental vacancy rate (percent) [9]	9.9	8.5	2.8	6.4	7
	# Owner-occupied housing units	531	557	431	452	297
	% Owner-occupied housing units	59.9	43.9	21.5	41.9	21.5
	# Renter-occupied housing units	356	711	1571	626	1085
	% Renter-occupied housing units	40.1	56.1	78.5	58.1	78.5
	% in Labor Force (Age 16 and up)	87.3	75.1	57.9	70.1	76.3
Employment	% Employed (age 16 and up)	76.7	67.6	37.1	64.4	70.5
	Unemployment Rate (Age 16 and up)	11.8	8.7	34.7	8	7.7
	# Less than HS Degree	39	186	355	109	152
Education	# with HS Degree	237	512	515	180	629
	# with Some College or Associate's Degree	298	283	294	209	320
	# with Bachelor's degree or higher	941	781	422	702	671
	Median Household Income	80039	76623	15119	76618	42244
Income	Median Family Income	80213	85341	10579	94543	47500

Census Tract	88.02	88.04	89.03	89.04
Hot Spot	504	504	504	504
Experimental / Control	Experimental	Experimental	Experimental	Experimental
Total Population	4119	2412	2633	3309
Pop 15 to 19 years	296	196	197	293
% Pop 15 to 19 years	7.2	8.1	7.5	8.9
Pop 20 to 24 years	335	175	181	246
% Pop 20 to 24 years	8.1	7.3	6.9	7.4
Pop 25 to 29 years	302	132	152	208
% Pop 25 to 29 years	7.3	5.5	5.8	6.3
Median age (years)	38.5	39.6	37.1	38.6
Pop 18 years and over	3301	1883	1992	2569
% Pop 18 years and over	80.1	78.1	75.7	77.6
Pop 62 years and over	702	292	382	410
% Pop 62 years and over	17	12.1	14.5	12.4
Male Pop 15 to 19 years	159	110	97	145
% Male Pop 15 to 19 years	3.9	4.6	3.7	4.4
Male Pop 20 to 24 years	159	89	75	109
% Male Pop 20 to 24 years	3.9	3.7	2.8	3.3
Male Pop 25 to 29 years	151	60	67	71
% Male Pop 25 to 29 years	3.7	2.5	2.5	2.1
Median age (years)	36	37.9	36.1	38.3
Male Pop 18 years and over	1541	890	859	1164
% Male Pop 18 years and over	37.4	36.9	32.6	35.2
Male Pop 62 years and over	248	129	150	180
% Male Pop 62 years and over	6	5.3	5.7	5.4
Pop White	357	121	65	49

Population

	% Pop White	8.7	5	2.5	1.5
	Pop Black or African American	3675	2214	2531	3229
	% Pop Black or African American	89.2	91.8	96.1	97.6
	Pop Hispanic or Latino (of any race)	172	130	67	61
	% Pop Hispanic or Latino (of any race)	4.2	5.4	2.5	1.8
	# Occupied housing units	1746	1096	1150	1539
	% Occupied housing units	87.3	78.5	82.2	86.1
	# Vacant housing units	253	300	249	249
	% Vacant housing units	12.7	21.5	17.8	13.9
Housing	Rental vacancy rate (percent) [9]	10.5	13.5	11.9	10.2
	# Owner-occupied housing units	758	283	317	150
	% Owner-occupied housing units	43.4	25.8	27.6	9.7
	# Renter-occupied housing units	988	813	833	1389
	% Renter-occupied housing units	56.6	74.2	72.4	90.3
	% in Labor Force (Age 16 and up)	64.4	59.2	72.6	66.6
Employment	% Employed (age 16 and up)	51	49.2	58.1	51.2
	Unemployment Rate (Age 16 and up)	19.6	16.8	20	23.1
	# Less than HS Degree	355	478	265	546
	# with HS Degree	630	565	549	735
Education	# with Some College or Associate's Degree	641	402	309	398
	# with Bachelor's degree or higher	664	171	141	261
	Median Household Income	38859	25978	26556	27620
Income	Median Family Income	47083	19345	32155	32219

	Census Tract	78.07	78.08
	Hot Spot	602	602
	Experimental / Control	Experimental	Experimental
	Total Population	2139	3646
	Pop 15 to 19 years	205	401
	% Pop 15 to 19 years	9.6	11
	Pop 20 to 24 years	158	267
	% Pop 20 to 24 years	7.4	7.3
	Pop 25 to 29 years	125	185
	% Pop 25 to 29 years	5.8	5.1
	Median age (years)	36.3	32.9
	Pop 18 years and over	1593	2544
	% Pop 18 years and over	74.5	69.8
	Pop 62 years and over	309	550
	% Pop 62 years and over	14.4	15.1
Population	Male Pop 15 to 19 years	95	205
	% Male Pop 15 to 19 years	4.4	5.6
	Male Pop 20 to 24 years	77	136
	% Male Pop 20 to 24 years	3.6	3.7
	Male Pop 25 to 29 years	58	82
	% Male Pop 25 to 29 years	2.7	2.2
	Median age (years)	33.2	28.9
	Male Pop 18 years and over	679	1111
	% Male Pop 18 years and over	31.7	30.5
	Male Pop 62 years and over	124	217
	% Male Pop 62 years and over	5.8	6
	Pop White	30	48
	% Pop White	1.4	1.3

	Pop Black or African American	2083	3542
	% Pop Black or African American	97.4	97.1
	Pop Hispanic or Latino (of any race)	49	77
	% Pop Hispanic or Latino (of any race)	2.3	2.1
	# Occupied housing units	810	1352
	% Occupied housing units	89.4	84.6
	# Vacant housing units	96	246
	% Vacant housing units	10.6	15.4
Housing	Rental vacancy rate (percent) [9]	9.3	12.2
	# Owner-occupied housing units	366	564
	% Owner-occupied housing units	45.2	41.7
	# Renter-occupied housing units	444	788
	% Renter-occupied housing units	54.8	58.3
	% in Labor Force (Age 16 and up)	57.7	56.3
Employment	% Employed (age 16 and up)	45.7	38.7
	Unemployment Rate (Age 16 and up)	20.9	30.6
	# Less than HS Degree	188	378
Education	# with HS Degree	509	710
	# with Some College or Associate's Degree	195	190
	# with Bachelor's degree or higher	84	198
Income	Median Household Income	27917	27531
	Median Family Income	43616	34412

	Census Tract	77.07	99.07
	Hot Spot	604	604
	Experimental / Control	Experimental	Experimental
	Total Population	3867	2836
	Pop 15 to 19 years	292	312
	% Pop 15 to 19 years	7.6	11
	Pop 20 to 24 years	250	205
	% Pop 20 to 24 years	6.5	7.2
	Pop 25 to 29 years	251	186
	% Pop 25 to 29 years	6.5	6.6
	Median age (years)	36.8	29.2
	Pop 18 years and over	2841	1893
	% Pop 18 years and over	73.5	66.7
	Pop 62 years and over	739	284
	% Pop 62 years and over	19.1	10
Population	Male Pop 15 to 19 years	136	156
	% Male Pop 15 to 19 years	3.5	5.5
	Male Pop 20 to 24 years	110	89
	% Male Pop 20 to 24 years	2.8	3.1
	Male Pop 25 to 29 years	104	60
	% Male Pop 25 to 29 years	2.7	2.1
	Median age (years)	32.8	23.5
	Male Pop 18 years and over	1181	724
	% Male Pop 18 years and over	30.5	25.5
	Male Pop 62 years and over	271	105
	% Male Pop 62 years and over	7	3.7
	Pop White	62	32
	% Pop White	1.6	1.1

	Pop Black or African American	3777	2810
	% Pop Black or African American	97.7	99.1
	Pop Hispanic or Latino (of any race)	64	30
	% Pop Hispanic or Latino (of any race)	1.7	1.1
	# Occupied housing units	1555	1097
	% Occupied housing units	90.4	93.3
	# Vacant housing units	166	79
	% Vacant housing units	9.6	6.7
Housing	Rental vacancy rate (percent) [9]	4.7	4.1
	# Owner-occupied housing units	797	250
	% Owner-occupied housing units	51.3	22.8
	# Renter-occupied housing units	758	847
	% Renter-occupied housing units	48.7	77.2
	% in Labor Force (Age 16 and up)	60.3	62.1
Employment	% Employed (age 16 and up)	52.1	50.9
	Unemployment Rate (Age 16 and up)	13.7	18
	# Less than HS Degree	203	260
Education	# with HS Degree	647	424
	# with Some College or Associate's Degree	540	350
	# with Bachelor's degree or higher	282	36
Income	Median Household Income	38571	26612
	Median Family Income	48183	27072

	Census Tract	97	98.02	98.1	98.11
	Hot Spot	706	706	706	706
	Experimental / Control	Experimental	Experimental	Experimental	Experimental
	Total Population	3177	1693	2507	4365
	Pop 15 to 19 years	341	157	176	367
	% Pop 15 to 19 years	10.7	9.3	7	8.4
	Pop 20 to 24 years	219	135	235	389
	% Pop 20 to 24 years	6.9	8	9.4	8.9
	Pop 25 to 29 years	203	137	216	368
	% Pop 25 to 29 years	6.4	8.1	8.6	8.4
	Median age (years)	32.7	28.4	29.3	28.2
	Pop 18 years and over	2256	1136	1734	2945
	% Pop 18 years and over	71	67.1	69.2	67.5
	Pop 62 years and over	435	164	192	359
	% Pop 62 years and over	13.7	9.7	7.7	8.2
Population	Male Pop 15 to 19 years	160	72	96	175
	% Male Pop 15 to 19 years	5	4.3	3.8	4
	Male Pop 20 to 24 years	97	55	79	135
	% Male Pop 20 to 24 years	3.1	3.2	3.2	3.1
	Male Pop 25 to 29 years	77	58	80	139
	% Male Pop 25 to 29 years	2.4	3.4	3.2	3.2
	Median age (years)	30.5	24.6	28.1	26.5
	Male Pop 18 years and over	922	436	710	1169
	% Male Pop 18 years and over	29	25.8	28.3	26.8
	Male Pop 62 years and over	176	55	81	136
	% Male Pop 62 years and over	5.5	3.2	3.2	3.1
	Pop White	30	17	23	49
	% Pop White	0.9	1	0.9	1.1

	Pop Black or African American	3132	1677	2479	4311
	% Pop Black or African American	98.6	99.1	98.9	98.8
	Pop Hispanic or Latino (of any race)	32	27	22	37
	% Pop Hispanic or Latino (of any race)	1	1.6	0.9	0.8
	# Occupied housing units	1179	677	1103	1819
	% Occupied housing units	90.2	79.8	94.2	91.9
	# Vacant housing units	128	171	68	160
	% Vacant housing units	9.8	20.2	5.8	8.1
Housing	Rental vacancy rate (percent) [9]	6.7	18.2	5	7.3
	# Owner-occupied housing units	461	223	86	223
	% Owner-occupied housing units	39.1	32.9	7.8	12.3
	# Renter-occupied housing units	718	454	1017	1596
	% Renter-occupied housing units	60.9	67.1	92.2	87.7
	% in Labor Force (Age 16 and up)	66.3	47.3	53.9	58.4
Employment	% Employed (age 16 and up)	52	42.3	47.4	43.4
	Unemployment Rate (Age 16 and up)	21.6	10.5	12.1	25.7
	# Less than HS Degree	78	86	169	167
Education	# with HS Degree	656	211	531	1093
	# with Some College or Associate's Degree	198	167	356	227
	# with Bachelor's degree or higher	121	61	27	115
Income	Median Household Income	31549	23633	26234	21713
	Median Family Income	37549	18333	25982	23214

Census Tract	28.01	28.02	29	30	31
Hot Spot	1	1	1	1	1
Experimental / Control	Control	Control	Control	Control	Control
Total Population	3773	4277	3962	3398	2885
Pop 15 to 19 years	155	164	175	179	140
% Pop 15 to 19 years	4.1	3.8	4.4	5.3	4.9
Pop 20 to 24 years	442	500	436	416	367
% Pop 20 to 24 years	11.7	11.7	11	12.2	12.7
Pop 25 to 29 years	656	689	704	650	451
% Pop 25 to 29 years	17.4	16.1	17.8	19.1	15.6
Median age (years)	30.9	31.3	31.3	30.1	31.4
Pop 18 years and over	3145	3568	3364	2854	2439
% Pop 18 years and over	83.4	83.4	84.9	84	84.5
Pop 62 years and over	334	438	308	285	275
% Pop 62 years and over	8.9	10.2	7.8	8.4	9.5
Male Pop 15 to 19 years	89	77	88	86	74
% Male Pop 15 to 19 years	2.4	1.8	2.2	2.5	2.6
Male Pop 20 to 24 years	219	229	219	156	189
% Male Pop 20 to 24 years	5.8	5.4	5.5	4.6	6.6
Male Pop 25 to 29 years	343	340	373	333	250
% Male Pop 25 to 29 years	9.1	7.9	9.4	9.8	8.7
Median age (years)	31.1	31.8	31.6	30.1	31.5
Male Pop 18 years and over	1637	1813	1792	1334	1318
% Male Pop 18 years and over	43.4	42.4	45.2	39.3	45.7
Male Pop 62 years and over	127	174	127	100	110
% Male Pop 62 years and over	3.4	4.1	3.2	2.9	3.8
Pop White	1354	1943	1798	1474	1039

	% Pop White	35.9	45.4	45.4	43.4	36
	Pop Black or African American	1428	1134	1298	1529	1124
	% Pop Black or African American	37.8	26.5	32.8	45	39
	Pop Hispanic or Latino (of any race)	1382	1843	1370	532	1037
	% Pop Hispanic or Latino (of any race)	36.6	43.1	34.6	15.7	35.9
Housing	# Occupied housing units	1646	1935	1448	1489	1009
	% Occupied housing units	90.4	90.3	88.1	93.1	89.2
	# Vacant housing units	174	207	195	110	122
	% Vacant housing units	9.6	9.7	11.9	6.9	10.8
	Rental vacancy rate (percent) [9]	9.8	6.1	5.4	4	7.6
	# Owner-occupied housing units	306	344	662	429	551
	% Owner-occupied housing units	18.6	17.8	45.7	28.8	54.6
	# Renter-occupied housing units	1340	1591	786	1060	458
	% Renter-occupied housing units	81.4	82.2	54.3	71.2	45.4
Employment	% in Labor Force (Age 16 and up)	67.3	78.1	75	79.9	69.2
	% Employed (age 16 and up)	61.9	73	65.9	68	63.8
	Unemployment Rate (Age 16 and up)	8.1	6.6	11.6	14.3	7.8
Education	# Less than HS Degree	750	1037	745	309	351
	# with HS Degree	425	345	545	139	326
	# with Some College or Associate's Degree	285	275	309	370	298
	# with Bachelor's degree or higher	835	917	991	1238	584
Income	Median Household Income	43661	41453	56000	52228	69063
	Median Family Income	52866	58704	58083	47989	67981

Source: 2010 United States Census

	Census Tract	91.02
	Hot Spot	2
	Experimental / Control	Control
Population	Total Population	4127
	Pop 15 to 19 years	410
	% Pop 15 to 19 years	9.9
	Pop 20 to 24 years	301
	% Pop 20 to 24 years	7.3
	Pop 25 to 29 years	235
	% Pop 25 to 29 years	5.7
	Median age (years)	35.5
	Pop 18 years and over	3039
	% Pop 18 years and over	73.6
	Pop 62 years and over	635
	% Pop 62 years and over	15.4
	Male Pop 15 to 19 years	188
	% Male Pop 15 to 19 years	4.6
	Male Pop 20 to 24 years	155
	% Male Pop 20 to 24 years	3.8
	Male Pop 25 to 29 years	95
	% Male Pop 25 to 29 years	2.3
	Median age (years)	33.3
	Male Pop 18 years and over	1285
	% Male Pop 18 years and over	31.1
	Male Pop 62 years and over	241
	% Male Pop 62 years and over	5.8
	Pop White	154
	% Pop White	3.7

	Pop Black or African American	3871
	% Pop Black or African American	93.8
	Pop Hispanic or Latino (of any race)	173
	% Pop Hispanic or Latino (of any race)	4.2
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	# Occupied housing units	1662
	% Occupied housing units	89.6
	# Vacant housing units	192
	% Vacant housing units	10.4
Housing	Rental vacancy rate (percent) [9]	7.1
	# Owner-occupied housing units	642
	% Owner-occupied housing units	38.6
	# Renter-occupied housing units	1020
	% Renter-occupied housing units	61.4
	<hr/>	
	% in Labor Force (Age 16 and up)	58.6
Employment	% Employed (age 16 and up)	50.2
	Unemployment Rate (Age 16 and up)	14.3
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	# Less than HS Degree	523
Education	# with HS Degree	908
	# with Some College or Associate's Degree	697
	# with Bachelor's degree or higher	358
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Income	Median Household Income	32806
	Median Family Income	34063
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	Census Tract	77.03	77.08	96.03
	Hot Spot	3	3	3
	Experimental / Control	Control	Control	Control
Population	Total Population	5187	2486	3373
	Pop 15 to 19 years	492	220	248
	% Pop 15 to 19 years	9.5	8.8	7.4
	Pop 20 to 24 years	390	151	207
	% Pop 20 to 24 years	7.5	6.1	6.1
	Pop 25 to 29 years	376	178	231
	% Pop 25 to 29 years	7.2	7.2	6.8
	Median age (years)	31.8	35.6	40.9
	Pop 18 years and over	3665	1837	2646
	% Pop 18 years and over	70.7	73.9	78.4
	Pop 62 years and over	606	349	665
	% Pop 62 years and over	11.7	14	19.7
	Male Pop 15 to 19 years	234	115	120
	% Male Pop 15 to 19 years	4.5	4.6	3.6
	Male Pop 20 to 24 years	177	67	99
	% Male Pop 20 to 24 years	3.4	2.7	2.9
	Male Pop 25 to 29 years	162	87	93
	% Male Pop 25 to 29 years	3.1	3.5	2.8
	Median age (years)	27.9	32.5	38.5
	Male Pop 18 years and over	1470	763	1148
	% Male Pop 18 years and over	28.3	30.7	34
	Male Pop 62 years and over	223	134	243
	% Male Pop 62 years and over	4.3	5.4	7.2
	Pop White	76	33	60
	% Pop White	1.5	1.3	1.8

	Pop Black or African American	4996	2460	3289
	% Pop Black or African American	96.3	99	97.5
	Pop Hispanic or Latino (of any race)	186	35	62
	% Pop Hispanic or Latino (of any race)	3.6	1.4	1.8
	# Occupied housing units	2103	1084	1588
	% Occupied housing units	89.9	85.9	90.7
	# Vacant housing units	235	178	162
	% Vacant housing units	10.1	14.1	9.3
Housing	Rental vacancy rate (percent) [9]	8.4	11.3	6
	# Owner-occupied housing units	510	208	459
	% Owner-occupied housing units	24.3	19.2	28.9
	# Renter-occupied housing units	1593	876	1129
	% Renter-occupied housing units	75.7	80.8	71.1
	% in Labor Force (Age 16 and up)	70	59.6	64.2
Employment	% Employed (age 16 and up)	53.7	48	51.6
	Unemployment Rate (Age 16 and up)	22.7	19.5	19.6
	# Less than HS Degree	580	105	192
Education	# with HS Degree	878	802	537
	# with Some College or Associate's Degree	858	453	636
	# with Bachelor's degree or higher	277	204	262
	Median Household Income	31955	35534	38404
Income	Median Family Income	40842	32105	51754

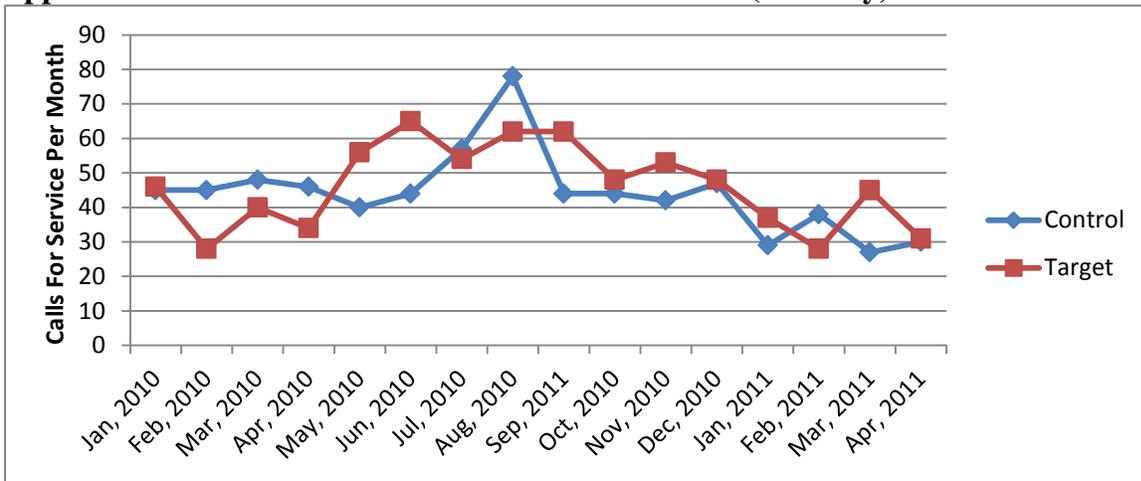
	Census Tract	73.04	74.03	74.04	74.09
	Hot Spot	4	4	4	4
	Experimental / Control	Control	Control	Control	Control
	Total Population	3546	2859	3310	3499
	Pop 15 to 19 years	351	293	410	288
	% Pop 15 to 19 years	9.9	10.2	12.4	8.2
	Pop 20 to 24 years	253	290	236	316
	% Pop 20 to 24 years	7.1	10.1	7.1	9
	Pop 25 to 29 years	265	244	245	285
	% Pop 25 to 29 years	7.5	8.5	7.4	8.1
	Median age (years)	30	26.8	26.4	26.6
	Pop 18 years and over	2429	1956	2100	2291
	% Pop 18 years and over	68.5	68.4	63.4	65.5
	Pop 62 years and over	468	223	214	259
	% Pop 62 years and over	13.2	7.8	6.5	7.4
Population	Male Pop 15 to 19 years	173	132	189	149
	% Male Pop 15 to 19 years	4.9	4.6	5.7	4.3
	Male Pop 20 to 24 years	106	104	110	121
	% Male Pop 20 to 24 years	3	3.6	3.3	3.5
	Male Pop 25 to 29 years	108	94	109	92
	% Male Pop 25 to 29 years	3	3.3	3.3	2.6
	Median age (years)	26.3	24.7	21.1	22.6
	Male Pop 18 years and over	970	769	795	860
	% Male Pop 18 years and over	27.4	26.9	24	24.6
	Male Pop 62 years and over	175	78	51	92
	% Male Pop 62 years and over	4.9	2.7	1.5	2.6
	Pop White	51	22	69	37
	% Pop White	1.4	0.8	2.1	1.1

	Pop Black or African American	3475	2835	3223	3461
	% Pop Black or African American	98	99.2	97.4	98.9
	Pop Hispanic or Latino (of any race)	38	24	64	34
	% Pop Hispanic or Latino (of any race)	1.1	0.8	1.9	1
Housing	# Occupied housing units	1198	1092	1106	1417
	% Occupied housing units	87.1	92.5	84.6	94
	# Vacant housing units	178	88	202	90
	% Vacant housing units	12.9	7.5	15.4	6
	Rental vacancy rate (percent) [9]	12.7	6.5	7.4	6
	# Owner-occupied housing units	292	99	275	327
	% Owner-occupied housing units	24.4	9.1	24.9	23.1
	# Renter-occupied housing units	906	993	831	1090
	% Renter-occupied housing units	75.6	90.9	75.1	76.9
Employment	% in Labor Force (Age 16 and up)	49.6	58.5	55.5	61.4
	% Employed (age 16 and up)	40.8	50.1	47.4	52.4
	Unemployment Rate (Age 16 and up)	17.8	14.4	14.5	14.8
Education	# Less than HS Degree	360	415	253	243
	# with HS Degree	666	721	446	844
	# with Some College or Associate's Degree	438	215	314	464
	# with Bachelor's degree or higher	236	46	242	155
Income	Median Household Income	31856	27333	26250	26636
	Median Family Income	22007	30879	24914	27368

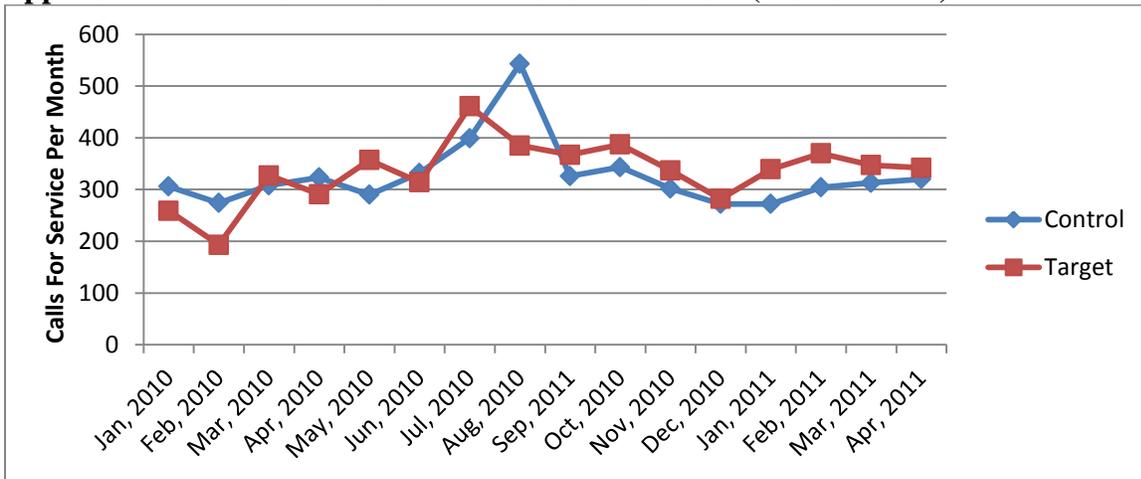
	Census Tract	98.04	104
	Hot Spot	5	5
	Experimental / Control	Control	Control
Population	Total Population	2473	4365
	Pop 15 to 19 years	233	298
	% Pop 15 to 19 years	9.4	6.8
	Pop 20 to 24 years	207	327
	% Pop 20 to 24 years	8.4	7.5
	Pop 25 to 29 years	154	348
	% Pop 25 to 29 years	6.2	8
	Median age (years)	32.5	37.7
	Pop 18 years and over	1778	3362
	% Pop 18 years and over	71.9	77
	Pop 62 years and over	302	518
	% Pop 62 years and over	12.2	11.9
	Male Pop 15 to 19 years	111	143
	% Male Pop 15 to 19 years	4.5	3.3
	Male Pop 20 to 24 years	105	150
	% Male Pop 20 to 24 years	4.2	3.4
	Male Pop 25 to 29 years	60	147
	% Male Pop 25 to 29 years	2.4	3.4
	Median age (years)	29.9	41.8
	Male Pop 18 years and over	758	1743
	% Male Pop 18 years and over	30.7	39.9
	Male Pop 62 years and over	112	258
	% Male Pop 62 years and over	4.5	5.9
	Pop White	63	166
	% Pop White	2.5	3.8

	Pop Black or African American	2401	4190
	% Pop Black or African American	97.1	96
	Pop Hispanic or Latino (of any race)	56	85
	% Pop Hispanic or Latino (of any race)	2.3	1.9
	# Occupied housing units	955	1528
	% Occupied housing units	89.2	83.6
	# Vacant housing units	116	300
	% Vacant housing units	10.8	16.4
Housing	Rental vacancy rate (percent) [9]	7.2	13.4
	# Owner-occupied housing units	364	489
	% Owner-occupied housing units	38.1	32
	# Renter-occupied housing units	591	1039
	% Renter-occupied housing units	61.9	68
	% in Labor Force (Age 16 and up)	51.8	65.3
Employment	% Employed (age 16 and up)	40.2	40.2
	Unemployment Rate (Age 16 and up)	22.3	32.6
	# Less than HS Degree	327	386
Education	# with HS Degree	436	1293
	# with Some College or Associate's Degree	386	680
	# with Bachelor's degree or higher	133	257
Income	Median Household Income	46554	33500
	Median Family Income	46284	43047

Appendix 6: Pre-Intervention Buffer-Zone Parallelism (Robbery)



Appendix 7: Pre-Intervention Buffer-Zone Parallelism (Instrumental)



Appendix 8: Targeted Cohort Characteristics by Hot Spot

SCI Hot Spot Label	Average by Hot Spot				
	1t	2t	3t	4t	5t
# of robbers	72	70	34	32	23
Age	31.32	34.31	33.35	35.38	37.23
% African-American	86.11	92.85	96.96	100.00	95.65
# prior arrests	15.75	17.02	11.55	9.47	10.48
# prior robbery arrests	1.41	1.22	1.03	1.02	1.03
# prior violent crime arrests	2.06	1.96	2.17	2.11	1.80
prior # of home residences	4.14	3.57	2.48	2.93	3.42
Avg distance to crime (meters)	2726.32	2588.43	1981.46	2081.91	2489.78
Age at first arrest	25.96	26.50	28.21	28.11	27.70
% of prior offenses in SCI areas	29.10	28.78	32.99	32.57	30.01
% of prior offenses in SCI buffers	6.29	7.30	6.25	4.72	5.40
% of prior offenses inside SCI and SCI buffers	35.39	36.08	39.24	37.30	35.41
% of prior offenses outside SCI and SCI buffers	64.61	63.92	60.76	62.70	64.59
% of prior offenses in control areas	0.99	1.50	2.41	2.64	2.48
% of prior offenses in control buffers	0.25	0.34	0.74	0.63	0.63
% of prior offenses inside control and control buffers	1.24	1.85	3.15	3.27	3.11
% of prior offenses outside control and control buffers	98.76	98.15	96.85	96.73	96.89
# arrests per year	0.98	1.06	0.72	0.59	0.66
Avg # days between arrests	355.24	328.73	484.42	590.81	533.87
Days between start of SCI and last arrest	197.48	211.72	269.57	280.39	205.16

Appendix 9: Control Cohort Characteristics by Hot Spot

Control Hot Spot Label	Average by Hot Spot				
	1c	2c	3c	4c	5c
# of robbers	69	62	53	33	27
Age	30.25	33.21	34.54	35.98	32.83
% African-American	84.05	95.15	94.33	90.90	96.29
# prior arrests	15.19	12.28	13.57	12.47	15.62
# prior robbery arrests	1.30	1.03	1.10	1.26	1.29
# prior violent crime arrests	2.39	1.50	1.78	2.10	2.28
prior # of home residences	3.98	3.20	3.62	3.50	3.73
Avg distance to crime (meters)	2945.03	2196.16	2681.49	2427.92	2837.25
Age at first arrest	27.79	28.85	27.37	28.54	28.57
% of prior offenses in SCI areas	1.97	2.64	2.95	2.41	2.37
% of prior offenses in SCI buffers	0.48	0.74	0.73	0.54	0.62
% of prior offenses inside SCI and SCI buffers	2.45	3.38	3.68	2.95	2.98
% of prior offenses outside SCI and SCI buffers	97.55	96.62	96.32	97.05	97.02
% of prior offenses in control areas	34.86	38.36	36.18	35.17	31.03
% of prior offenses in control buffers	6.28	4.29	4.83	5.83	5.30
% of prior offenses inside control and control buffers	41.13	42.65	41.01	41.00	36.33
% of prior offenses outside control and control buffers	58.87	57.35	58.99	59.00	63.67
# arrests per year	0.95	0.77	0.85	0.78	0.98
Avg # days between arrests	368.40	455.45	412.23	448.57	358.11
Days between start of SCI and last arrest	204.67	223.61	214.96	230.51	279.19

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